THIS REPORT HAS BEEN DELIMITED
AND CLEARED FOR PUBLIC RELEASE
UNDER DOD DIRECTIVE 5200.20 AND
NO RESTRICTIONS ARE IMPOSED UPON
ITS USE AND DISCLOSURE.

DISTRIBUTION STATEMENT A

APPROVED FOR PUBLIC RELEASE;
DISTRIBUTION UNLIMITED.

UNCLASSIFIED

43099

d Servicess Technical Information Agency

ARLINGTON HALL STATION
ARLINGTON 12 VIRGINIA

ARD
ONI

WHEN GOVERNMENT OR OTHER DRAWINGS, SPECIFICATIONS OR OTHER DATA FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED ENT PROCUREMENT OPERATION, THE U. S. GOVERNMENT THEREBY INCURS NSIBILITY, NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE ENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE WINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY ION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER R CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, LL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

ASSIFICATION CHANGED TO UNCLASSIFIED

AUTHORITY OF ASTIA RECLASS. BULLETIN 12

1 Sept. 58 Signed Richard L. Reedy

OFFICE SECURITY ADVISOR

RDR
Maj Zoton

AD No. 43099
ASTIA FILE COPY

INFORMATION

THE MUNICIPAL UNIVERSITY OF WICHITA

PRELIMINARY REPORT ON WIND-TUNNEL TESTS OF THE ONR SWEPT-WING RESEARCH MODEL

by Richard E. Wallace

Aerodynamic Report No. 062

for the Office of Naval Research
Contract N-onr 201(01)

October 1952
University of Wichita
School of Engineering
Wichita, Kansas

INFORMATION

54AA 56260

Reproduced

FROM LOW CONTRAST COPY.

NOTICE: THIS DOCUMENT CONTAINS INFORMATION AFFECTING THE NATIONAL DEFENSE OF THE UNITED STATES WITHIN THE MEANING OF THE ESPIONAGE LAWS, TITLE 18, U.S.C., SECTIONS 793 and 794. THE TRANSMISSION OR THE REVELATION OF ITS CONTENTS IN ANY MANNER TO AN UNAUTHORIZED PERSON IS PROHIBITED BY LAW.

INFO[illegible]ION

PRELIMINARY REPORT ON WIND-TUNNEL TESTS OF THE ONR SWEPT-WING RESEARCH MODEL

by Richard E. Wallace

Aerodynamic Report No. 062

for the Office of Naval Research
Contract No. Nonr-201(01)

October 1952

University of Wichita
School of Engineering
Wichita, Kansas

54AA 56260

CO[illegible]

C4-019[illegible]

INFORMATION

PRELIMINARY REPORT ON WIND-TUNNEL TESTS OF THE ONR SWEPT-WING RESEARCH MODEL

SUMMARY

Test results for a semispan, reflection-plane, quarter-scale model of the Douglas F3D-3 swept wing (ONR RM-4) are presented as tuft studies, three component curves and pressure distributions. A complete angle of attack range from -4 degrees to +30 degrees was used on the 36-degree swept wing for the plain configuration and also with the 25 percent chord, slotted flap deflected at angles to 45 degrees.

The information given herein is routine in nature for a swept wing and is the primary step in a detailed analysis of the wing pressure distribution, boundary layer and circulation as affected by outboard blowing slots. A maximum lift coefficient of 1.00 was measured for zero flap deflection at an attack angle of 20 degrees and 1.28 for 45-degree flap deflection at 11-degree angle of attack. Integration of the pressure profiles over the wing surface checked very closely the lift and drag curves as measured directly by the tunnel balance system. Also, close correlation was found between the tuft pictures, the force data and the pressure distributions, which indicated that separated areas were directly related to the force and pressure deviations. The static longitudinal instability associated with the tip stall caused by spanwise boundary-layer growth was pronounced and

INFORMATION

C4-01[illegible]

CONFIDENTIAL
INFORMATION

proved to be the main area for concern regarding high lift techniques from boundary-layer and circulation control.

LIST OF FIGURES

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

13) Variation of local-normal-force coefficient profiles along the semispan at an angle of attack with forty-five degrees flap deflection.

14) Isobars on the wing upper surface with $\delta_F = 0^{\circ}$.

15) Isobars on the wing upper surface with $\delta_F = 15^{\circ}$.

16) Isobars on the wing upper surface with $\delta_F = 30^{\circ}$.

17) Isobars on the wing upper surface with $\delta_F = 45^{\circ}$.

18) Pressure-coefficient values for 0° flap deflection.

19) Pressure-coefficient values for 15° flap deflection.

20) Pressure-coefficient values for 30° flap deflection.

21) Pressure-coefficient values for 45° flap deflection.

22) Centers of pressure for the local normal force profiles.

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

LIST OF APPENDICES

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

INTRODUCTION

As a basis for comparison with a similar wing having a system of boundary-layer and circulation control (hereinafter called BL-C control) the described test program was conducted to gain information about the 36-degree swept wing with 6-series sections. The tests gave an insight to the importance of controlling the spanwise boundary-layer growth for the dual purpose of improving the longitudinal-stability and the tip-flow or stall characteristics. It is well to note here that swept-wing boundary layer theory is well established and proved experimentally for swept wings (Refs. 1 and 2).

Since good success has been achieved both experimentally and practically with boundary-layer and circulation control of thick-straight wings, the proposal was made for similar application to thin-swept wings (Refs. 3 and 4). This required adequate knowledge of swept wing boundary-layer characteristics or more importantly the pressure distributions. The art of theoretically predicting pressure distributions, lift distributions, etc., is not adequate to date for analyzing in detail the effects of flow discontinuities due to suction or pressure slots on a finite span swept wing. Therefore, these results were desired for direct comparison with exactly the same wing equipped with an outboard hinged-leading edge and an aileron-blowing slot on the trailing edge.

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

Also, they shall serve to check the theoretical work conducted in an effort to understand the measured aerodynamic characteristics with the aim of predicting idealized limits of BL-C control for a swept wing.

These tests are concerned only with the two forces lift and drag and the pitching moment.

NOMENCLATURE

S = wing area, square feet

b = wing span measured perpendicularly to the plane of symmetry, feet

c = wing chord measured parallel to the plane of symmetry, feet

c_o = wing root chord, feet

c_t = wing tip chord, feet

$\bar{c}$ = wing mean aerodynamic chord, feet

λ = taper ratio, tip chord divided by root chord, c_t/c_o

σ = sweep angle of quarter-chord line, positive for sweepback, degrees.

C_L = wing lift coefficient, total lift/qS

c_l = section lift coefficient, section lift/qS

C_D = wing drag coefficient, total drag/qS

c_{d_o} = section profile drag coefficient, section profile drag/qS

C_M = wing pitching moment about $\bar{c}/4$, total moment/$qS\bar{c}$

c_m = section pitching moment, section moment/qSc

c_N = section normal force coefficient, normal force/qS

c_c = section chordwise force coefficient, chordwise force/qS

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

q = free-stream dynamic pressure $(\frac{1}{2}\rho V^2)$, pounds per square foot

ρ = air density, slugs per cubic foot

V = free air stream velocity, feet per second

p = static pressure, pounds per square foot

p_o = free-stream static pressure, pounds per square foot

P = pressure coefficient, $(p-p_o)/q$

x = longitudinal coordinate in the wing plane positive forward, feet

y = lateral coordinate in the wing plane positive to the right, feet

δ_F = angle of flap deflection measured from the chord line

α_t = test angle of attack based on the root section

Δ = incremental change in the indicated symbol value

max = subscript denoting maximum value for the configuration

CORRECTIONS

In this data no corrections have been applied for angle of flow, image, downwash, etc. This was not done for two reasons. First, for the balance data to be checked by the pressure distributions, the uncorrected data must be used. Also, since the tests ultimately are to be compared to additional wind-tunnel tests, the corrections would be superfluous in the immediate problem. Second, the time was not available to go through the usual lifting-line theory correction computations using an infinite array of images.

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

It is contemplated that the force data will be corrected for the tunnel walls in the final report, although as mentioned before the corrections were not important here.

APPARATUS

The one-fourth scale model of the Douglas F3D-3 wing was tested in the University of Wichita 7- by 10-foot wind tunnel which is described in reference 5. The model was constructed of laminated mahogany and finished with sanding sealer to produce an aerodynamically smooth surface. The pressure taps were in plastic buttons imbedded in the model surface with plastic tubing connected as lead-outs to the manometer board. Details of the model and its rigging are shown in the photographs of figure 2.

A straight taper was used from the root airfoil section NACA 63-011.64 to the theoretical tip section NACA 63-008. The root section thickness came as the result of the fuselage-wing juncture at that point. Thus, the tested wing was the wing outside of the fuselage, i.e., the true aerodynamic lifting surface. Neither twist nor dihedral was used in building or mounting the model. The sweep angle was 36 degrees measured through the root and tip sections quarter-chord points.

The slotted flap was 46 percent of the model span in length and was rotated about a point 8 percent of the local chord below the chord line and 80.6 percent of the local

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

chord aft of the leading edge. Coordinates of the basic airfoil sections, flap nose and the wing tip are given in Appendix A. The flap was moved in 15-degree increments to 45 degrees maximum deflection by changing the steel brackets. The model had no aileron.

The model was mounted on two fittings, with the center of rotation located 24.37 inches aft of the root-section leading edge. On the end plate a ring mount was used and in the wind stream a single strut was attached in a submerged trunnion fitting.

A summary of the model physical dimensions is given in figure 1 and the pertinent data as follows:

Wing semispan	=	65.75" (Root 9.25" from center-line fuselage)
Root chord	=	36.70"
Tip chord	=	13.25"
Wing area	=	11.36 ft.^{2}
Aspect ratio	=	5.28

Sweep angle of root-to-tip quarter-chord line = 36°

Root section NACA 63-011.64

Tip section NACA 63-008

Centerline fuselage section NACA 63-012

Flap span	=	46 o/o model span
Model scale	=	one-quarter full scale

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

TESTS

The wind-tunnel tests of the swept wing model were all run at a dynamic pressure of 26.3 pounds per square foot which corresponded to an airspeed of 90.6 knots or 104 mph. and an effective Reynolds number of 2.70×10^6 based on the wing-mean-aerodynamic chord. The wind-tunnel turbulence factor is 1.33.

Tests for lift, drag and pitching moment and all the pressure distribution data were run through an attack angle range of -4 to +30 degrees with flap settings in 15-degree increments to 45 degrees. Tuft studies of the stall development were conducted at the same dynamic pressure, but the angles of attack were limited to a range of 6 to 18 degrees for the two flap settings of 0 and 45 degrees.

DISCUSSION OF TEST RESULTS

To obtain a pictorial exposition of the surface flow conditions on the wing near and at the stall point a series of photographs were taken for zero and forty-five degree flap deflections. As outlined previously, the photographs were taken at one degree intervals betw 6 and 16 degree angles of attack and also at 18 degrees. The results are presented as figures 3 and 4.

The clean configuration, i.e., no flap deflection, started a noticeable spanwise flow at an attack angle of

CONFIDENTIAL
INFORMATION

9 degrees which developed into a tip separation at 10 degrees. Further increases in angle of attack extended the separated area inboard in a gradual manner so that the flow on one-third of the wing separated at 11 degrees, half at 14 degrees and three-quarters at 16 degrees. Later in the discussion the correlation of the force curves to the pressure distributions is noted.

With a full flap deflection of 45 degrees the flap remained unstalled throughout the depicted range of attack angles. Stall or separation of the wing surface flow in this configuration started at 7 degrees angle of attack and progressed to one-third of the area at 8 degrees, half at 10 degrees and three-quarters at 15 degrees. (Note the delay in the stall progression in the area ahead of the slotted flap from 9 to 13 degrees angle of attack.) The flapped wing started its stall at a lower angle of attack than the unflapped wing so that the area ahead of the flap was slightly more stable. It would appear that 'dams' might prove beneficial in increasing the effectiveness of an aileron on such a wing. This is because the spanwise thickening of the boundary layer induces separation of the flow at a low angle-of-attack.

Force curves for the wing are presented in figures 5 and 6. These data were not corrected for wind-tunnel wall effects, strut interference, or the tunnel wall boundary-layer as previously noted. The pitching moments were

CONFIDENTIAL
INFORMATION

transferred from the model pivot point to the calculated aerodynamic center quarter-chord point. Location of the aerodynamic center is discussed in appendix B. It was assumed that the remaining pitching-moment curve slope could be erased by appropriate corrections due to the tunnel walls.

The force curves show the typical types of aerodynamic characteristics for a tapered swept wing. A gradual stall was started at a low angle of attack with the drag rise quickly assuming a linear relation to the angle of attack. In every case with the flaps deflected the drag rise was coincident with the break in the lift curve. Similar correlation was evident in the tuft studies and the pressure distribution profiles along the semispan.

The curves show that the drag increment caused by flap deflection was not proportional to the deflection angle at the lower angles of attack, but became linearly related to the flap deflection after the stall started and had caused the force curves to break. The lift curve increments show exactly the opposite effects, being linearly related to the flap deflection below the force curve breaks. Increments in the pitching-moment curves due to the flap were independent of the force curve breaks. This was surprising because of the difference in the pressure distributions for the various flap settings and the manner in which the center of lift moved along the wing span, especially after the stall. Longitudinal instability at the stall was not too severe, but

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

amounted to about $\Delta C_M = +0.10$ over a ten degree angle of attack range beyond the stall. Such a shift in the moment curve appeared for all flap angles.

Slopes of the lift curves decreased slightly with increased flap deflections from 0.0678 with zero flap deflection to 0.0623 per degree with a full flap deflection of 45 degrees. The slope of the pitching moment curves was nearly constant for all flap angles at a value of 0.0053 per degree.

A comparison of the flap effectiveness at a low angle of attack with that at maximum lift coefficient is presented as figure 7. The increments of lift at $C_{L_{max}}$ are about 0.4 of those at the low angles of attack, i.e., up to eight degrees. Also, the curve for the maximum lift coefficient increment is slightly curved with decreasing slope for the higher flap deflections while the other is a straight line.

The next figure, 8, demonstrated a comparison of the measured results from the wind-tunnel balances (uncorrected) to the integrated values from the pressure distributions. At the low angles of attack the behavior of the two curves is much as would be expected with the lift curves identical and the drag curves differing by the amount of viscous drag. Beyond the stall angle-of-attack the lift curve from the integrated data is somewhat higher than the measured-value curve. Some of the difference could have been caused by accumulated experimental error, but this would seem unlikely since the trend is consistent for the last three points.

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

The drag curves differ by an amount due to the viscous drag which plays a less important part of the total drag as the angle of attack is increased. In general, it was felt that the correlation between the two methods was satisfactory.

Variations of the center of lift on the semispan model are presented in figure 9. As an average value over the useable flight range of attack angles, it appears reasonable to use the value of 0.525 for 2y/b as compared to the mean aerodynamic center location of 0.416.

Figures 10a to 10d show the integrated results of the normal force coefficient profile plots for the case of zero flap deflection. They demonstrate both the section and weighted values of lift and drag coefficients as distributed across the semispan. The drag curves show the high drag near the tip and also the lower drag area inboard. These extremes may be directly traced back to the tuft studies as being related to the separated areas.

A more graphic picture of the lift distribution is presented in figures 11a to 11d. These three-dimensional composite graphs show the spanwise normal-force coefficient as a function of the angle of attack. Here again is shown the strong tendency of the wing tip to lift more than the inboard section and then stall so that the center of lift shifts toward the wing root. Such a procedure may be seen in all four of the figures with the different flap deflections. For increasing flap deflections another trend

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

may be noted in the area shift caused by the flap, which in turn was accompanied by a higher lift value on the tip.

These curves were plotted on a spanwise axis corresponding to the entire semispan including the fuselage area. While the spanwise station lines are the same as in the remainder of the figures, their values on the scale have different values. Also, the indicated uncorrected values determined from the balances are for the outboard 87.8 percent of the semispan, i.e. the area outside of the fuselage.

The next series of figures, 12 and 13, show the spanwise variation of the normal force coefficient profiles. These are the profiles which were integrated to give the section normal force coefficients of figure 11. Due to the physical limitation on the number of pressure taps on the nose of the model, the maximum pressure coefficient as indicated does not in all cases actually represent the true peak pressure coefficient value.

Here also may be noted the essential characteristics of a tapered swept wing. At the root of the wing the profile is weaker and grows stronger as the tip is approached. To the point of stall all the profiles are similar, but at the stall the shift of the peak pressure coefficients is towards the root of the wing. The highest pressure coefficient measured was near the root of the wing at an angle of attack of 16 degrees, its value being -7.0. No noticeable differences occurred between the clean and flapped configurations

CONFIDENTIAL
INFORMATION

in these two figures that was not basically evident from the other presentations. However the stall progression, flap not stalling through the useable angle of attack range, and shift of the center of lift inboard are again all clearly shown.

Figures 14 through 17 present the isobars on the wing upper surface for the range of flap deflections at the indicated attack angles. These few plots show essentially the same information as the normal-force profiles of figures 12 and 13. The most noticeable characteristic in these figures is the distinct loss of linearity of the lines toward the tip as separation occurs. This is especially well defined in the series of sketches for zero flap deflection and the angles of attack 8, 12 and 16 degrees.

CONCLUSIONS

A reflection-plane quarter-scale model of the Douglas F3D-3 swept wing was tested to obtain its basic traits. These test results, presented as force and pressure-distribution data, showed the tip stall from spanwise boundary-layer flow to be the primary area for concern. The tuft study, force data and pressure distributions all agreed very closely on the separation or stall phenomenon of this wing. While a certain degree of control could be exerted on the boundary growth by fences, the desire for such control only at high lift coefficients lends itself more appropriately to BL-C control which is the second phase of the test program.

CONFIDENTIAL
INFORMATION

LIST OF REFERENCES

1) Altman, John M. and Hayter, Nora-Lee F.: A Comparison of the Turbulent Boundary-layer Growth on an Unswept and a Swept Wing. NACA TN 2500, September 1951.

2) Kuethe, A. M.; McKee, P. B.; and Curry, W. H. : Measurements in the Boundary Layer of a Yawed Wing. TN 1946, September 1949.

3) Waring, H. F. and Razak, K. : Flight Test Performance Report, Cessna Model 309. Cessna Aircraft Co. Report No. 1309-3, July 2, 1952.

4) Razak, Kenneth; Razak, Virgil and Bondie, R. J., Jr.: Wind-Tunnel Investigation of a method of Boundary-Layer Control as Applied to a Reflection-Plane Model at Full-Scale Reynolds Number. University of Wichita Engineering Report No. 032, June 1951.

5) Razak, Kenneth: The University of Wichita 7- by 10-foot Wind Tunnel. Engineering Report No. 022, April 1950.

6) Abbott, Ira H. and VonDoenhoff, Albert E. : Theory of Wing Sections. McGraw-Hill Book Company, 1949.

7) DeYoung, John: Theoretical Additional Span Loading Characteristics of Wings with Arbitrary Sweep, Aspect Ratio, and Taper Ratio. NACA TN 1491, December 1947.

CONFIDENTIAL
INFORMATION

APPENDIX A

NACA 63-009

(Stations and ordinates given in percent of airfoil chord)

Upper surface		Lower surface	
Station	Ordinate	Station	Ordinate
0	0	0	0
.5	.749	.5	- .749
.75	.906	.75	- .906
1.25	1.151	1.25	-1.151
2.5	1.582	2.5	-1.582
5.0	2.196	5.0	-2.196
7.5	2.655	7.5	-2.655
10	3.024	10	-3.024
15	3.591	15	-3.591
20	3.997	20	-3.997
25	4.275	25	-4.275
30	4.442	30	-4.442
35	4.500	35	-4.500
40	4.447	40	-4.447
45	4.296	45	-4.296
50	4.056	50	-4.056
55	3.739	55	-3.739
60	3.358	60	-3.358
65	2.928	65	-2.928
70	2.453	70	-2.458
75	1.966	75	-1.966
80	1.471	80	-1.471
85	.990	85	- .990
90	.550	90	- .550
95	.196	95	- .196
100	0	100	0

L. E. radius: 0.631

NACA 63_1-012

(Stations and ordinates given in percent of airfoil chord)

Upper surface		Lower surface	
Station	Ordinate	Station	Ordinate
0	0	0	0
.5	.985	.5	- .985
.75	1.194	.75	-1.194
1.25	1.519	1.25	-1.519
2.5	2.102	2.5	-2.102
5.0	2.925	5.0	-2.925
7.5	3.542	7.5	-3.542
10	4.039	10	-4.039
15	4.799	15	-4.799
20	5.342	20	-5.342
25	5.712	25	-5.712
30	5.930	30	-5.930
35	6.000	35	-6.000
40	5.920	40	-5.920
45	5.704	45	-5.704
50	5.370	50	-5.370
55	4.935	55	-4.935
60	4.420	60	-4.420
65	3.840	65	-3.840
70	3.210	70	-3.210
75	2.556	75	-2.556
80	1.902	80	-1.902
85	1.274	85	-1.274
90	.707	90	- .707
95	.250	95	- .250
100	0	100	0

L. E. radius: 1.087

CONFIDENTIAL
INFORMATION

FLAP NOSE COORDINATES

Note: These coordinates are referenced to the 80 percent points of the local chords as the origin.

PERCENT CHORD	ABSCISSA (X in.)	ORDINATE (Z in.)
	Wing Sta. 0.75	
75.00	+1.822	-0.595 and -0.899
75.50	+1.164	-0.220
76.00	+1.457	-0.065
77.50	+0.911	+0.215
80.00	0.000	+0.432 and -0.673
82.50	-0.911	+0.492
83.58	-1.304	+0.484
85.00	-1.822	±0.455
Tangency Point	-2.120	+0.421
90.00	-3.643	±0.259
95.00	-5.465	±0.101
100.00	-7.287	0.000
L.E. Radius Center	+1.521	-0.595
	Wing Sta. 33.50	
75.00	+1.238	-0.376 and -0.566
75.50	+1.114	-0.140
76.00	+0.990	-0.038
77.50	+0.619	+0.139
80.00	0.000	+0.267 and -0.425
82.50	-0.619	+0.300
83.58	-0.886	+0.296
85.00	-1.238	+0.290
Tangency Point	-1.658	+0.248
90.00	-1.238	+0.167
95.00	-3.713	+0.069
100.00	-4.951	0.000
L.E. Radius Center	+1.080	-0.375

The flap was hinged about a point 8 percent of the local chord below the chord line and 80.6 percent of the local chord aft of the section leading edge.

CONFIDENTIAL
INFORMATION

WING-TIP COORDINATES

Note: These coordinates are referred to the trailing edge of the tip chord at station 63.10.

X - distance from the tip chord trailing-edge, inches	Y - distance normal to the tip-chord plane, inches
0.000	1.325
0.313	1.750
0.625	1.950
1.250	2.175
2.500	4.450
5.000	2.650
7.500	2.570
10.000	2.250
12.500	1.400

This curve was faired to the leading and trailing edges of the wing.

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

APPENDIX B

The equation in reference 6 on page 19 was used in calculating the aerodynamic center of this swept wing as follows:

$$\frac{X_{a.c.}}{S/b} = HA \tan \beta$$

where

$X_{a.c.}$ = longitudinal distance between the aerodynamic center of the root section and aerodynamic center of the wing, positive to the rear.

S = wing area

b = wing span

H = factor presented in graphical form in the reference test = 0.208

A = wing aspect ratio

β = angle of sweepback

From the model constants this gives:

$$X_{a.c.} = Hb \tan \beta$$

$$= 0.208 \times 2 \times 65.75 \times \tan 35.8^{\circ}$$

$X_{a.c.}$ = 19.72 in. behind the root section aerodynamic chord

Thus the wing aerodynamic center becomes 9.62 + 19.72 = 29.34 inches behind the root chord leading edge, corresponding to a span station of 27.33 inches with a section chord of 26.94 inches.

In these calculations the aerodynamic center data on the sections, 63-006, 63-009 and 63_1-012, were used with

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

linear interpolation. It was on this basis that the sweep-back angle of 35.8° was calculated for the line between the root and tip chord aerodynamic centers.

In more recent calculations it appeared that this value is slightly small, i.e., the wing aerodynamic center distance $X_{a.c.}$. Reference 7 uses the e.

$$a.c. = \frac{1}{4} + \frac{3(1+\lambda)^2}{8(1+\lambda+\lambda^2)} \left[\eta\, c.p. - \frac{1+2\lambda}{3(1+\lambda)} \right] AR \tan \Lambda c/4$$

= distance of the wing aerodynamic center behind the leading edge of the centroid-of-area chord.

This equation results in $X_{a.c.}$ = 20.70 inches which is essentially an inch behind the previous value. Such a correction would reduce the slope of the transferred pitching moments to about half its presented value. Therefore, the tunnel data would still not quite check the aerodynamic center calculations. As assumed in the text, the remainder can possibly be attributed to tunnel wall interference.

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

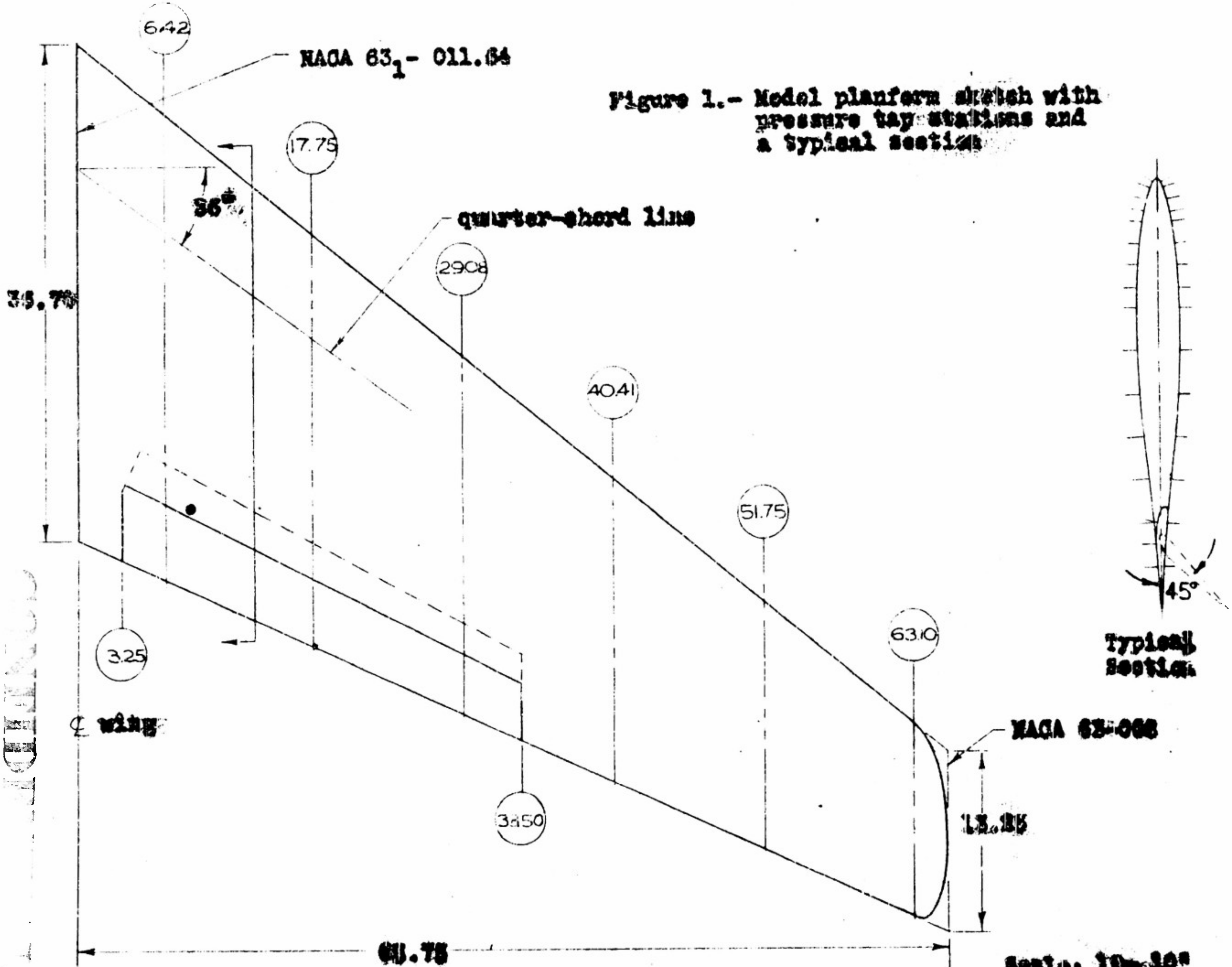


Figure 1.- Model planform sketch with pressure tap stations and a typical section.

CONFIDENTIAL
INFORMATION

TEST: ONR RM-4
FOR: Office of Naval Research
BY: Richard E. Wallace

TEST NO:
REYNOLDS NO: 2.70×10^6
DATE: October 1952

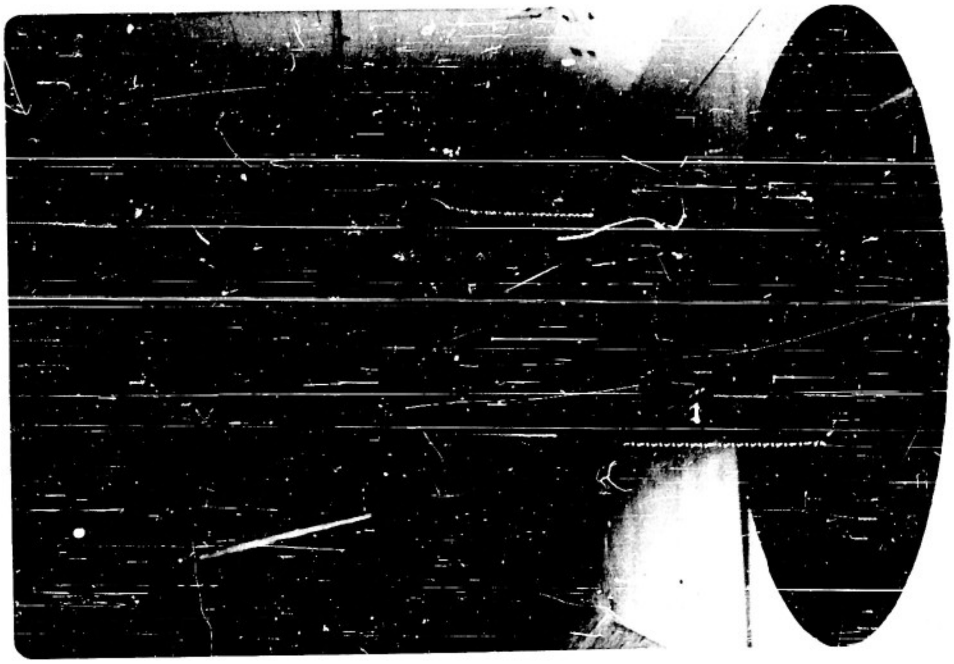


Figure 2a.- Front view of the model mounted in the tunnel.

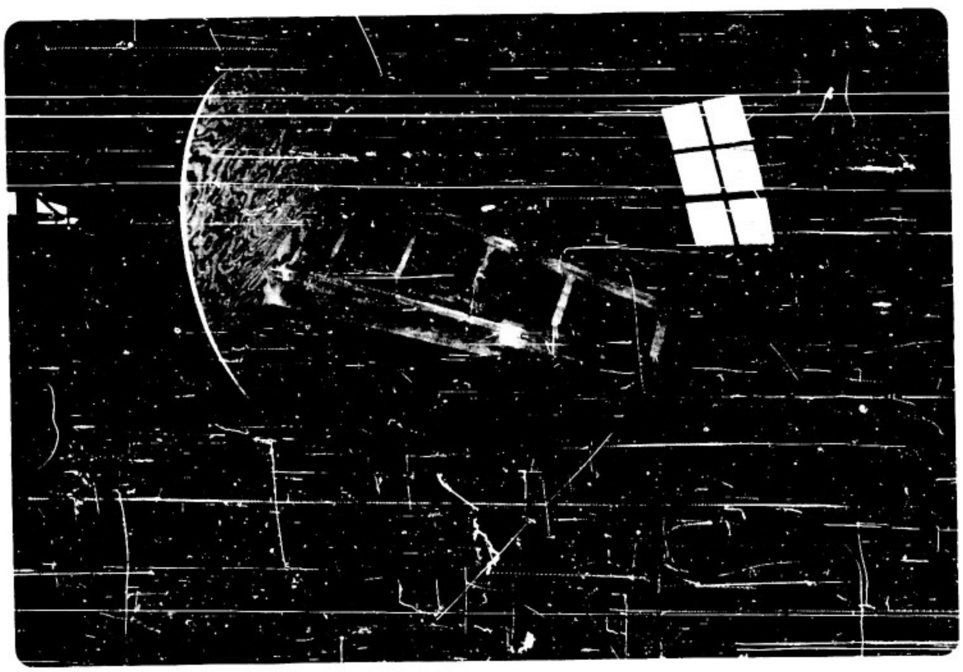


Figure 2b.- Completed model mounted on the end-plate rigging.

TEST: ONR RM-4
FOR: Office of Naval Research
BY: Richard E. Wallace

TEST NO:
REYNOLDS NO: 2.70×10^6
DATE: October 1952

Figure 2c.- External balance rigging, angle-of-attack mechanism, and pressure tubes.

Figure 2d.- Close-up view showing flap juncture and brackets and the pressure tap buttons.

UNIVERSITY OF WICHITA
SCHOOL OF ENGINEERING
AERODYNAMICS LABORATORY

CONFIDENTIAL

TEST: ONR RM-4
FOR BY: Office of Naval Research

TEST NO:
REYNOLDS NO: 2.70×10^6
DATE: October 1952

Fig. 3.- Tuft pictures of the plain wing configuration, $\delta_F = 0^\circ$, $\alpha_t = 6^\circ$.

Fig. 3 (cont'd.).- $\alpha_t = 7^\circ$.

CONF

Figure 3.- Continued; $\alpha_t = 8°$.

Figure 3.- Continued; $\alpha_t = 9°$.

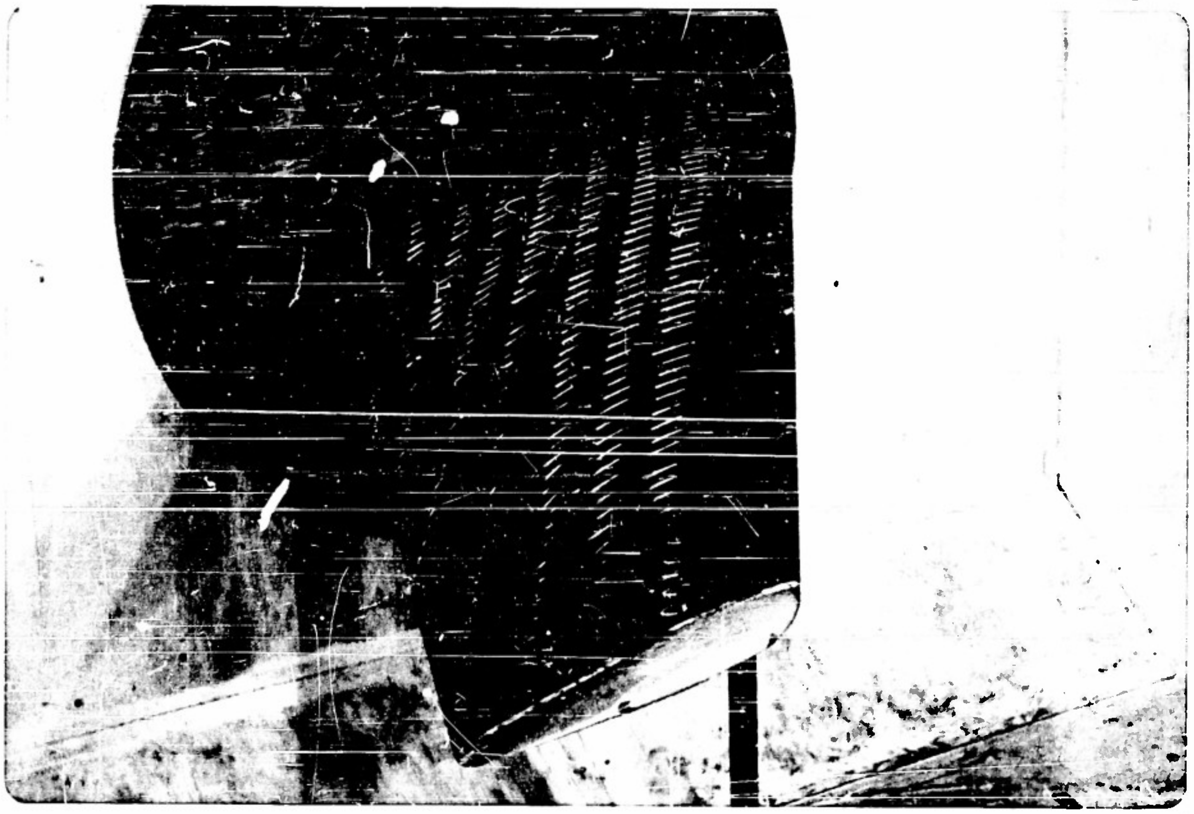


Figure 3.- Continued; $\alpha_t = 10^\circ$.

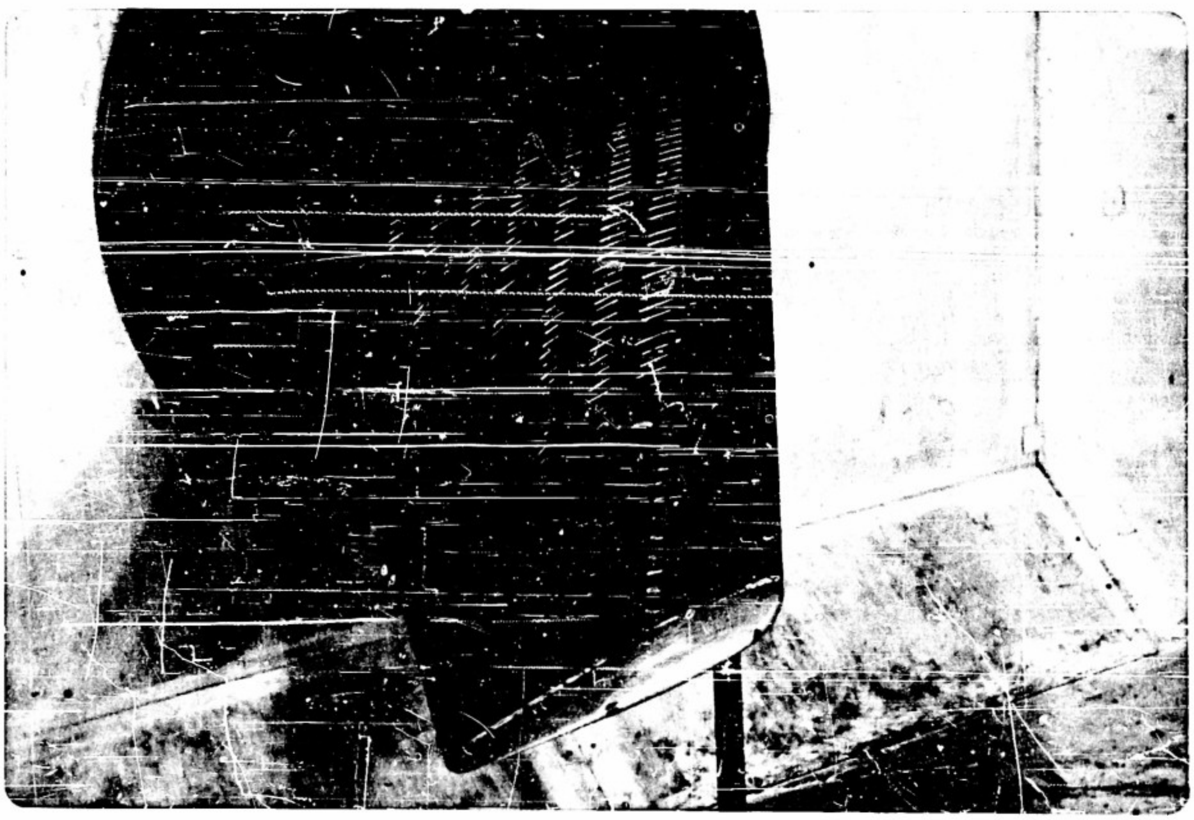


Figure 3.- Continued; $\alpha_t = 11^\circ$.

Figure 3.- Continued; $\alpha_t = 12°$.

Figure 3.- Continued; $\alpha_t = 13°$.

Figure 3.- Continued; $\alpha_t = 14°$.

Figure 3.- Continued; $\alpha_t = 15°$.

Figure 3.- Continued; $\alpha_t = 16°$.

Figure 3.- Concluded; $\alpha_t = 18°$.

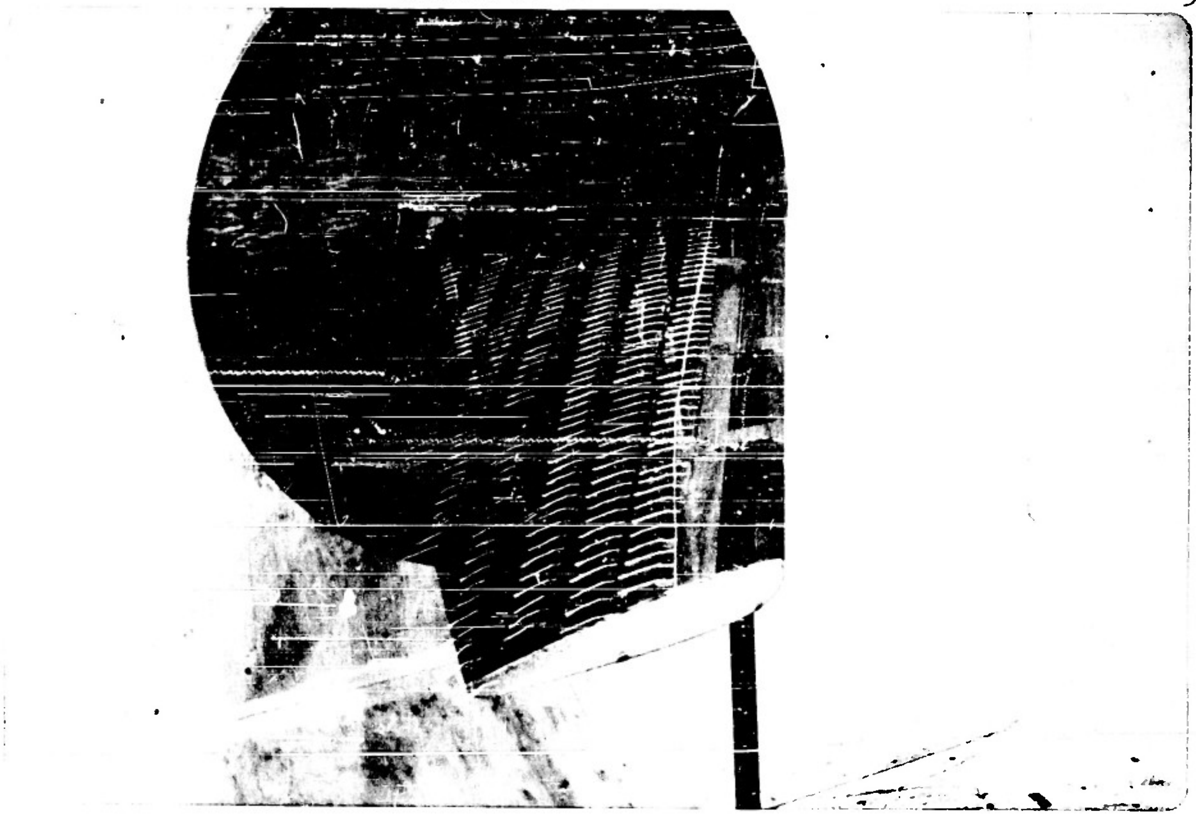


Figure 4.- Tuft pictures of the flapped wing configuration, $\delta_F = 45°$, $\alpha_t = 6°$.

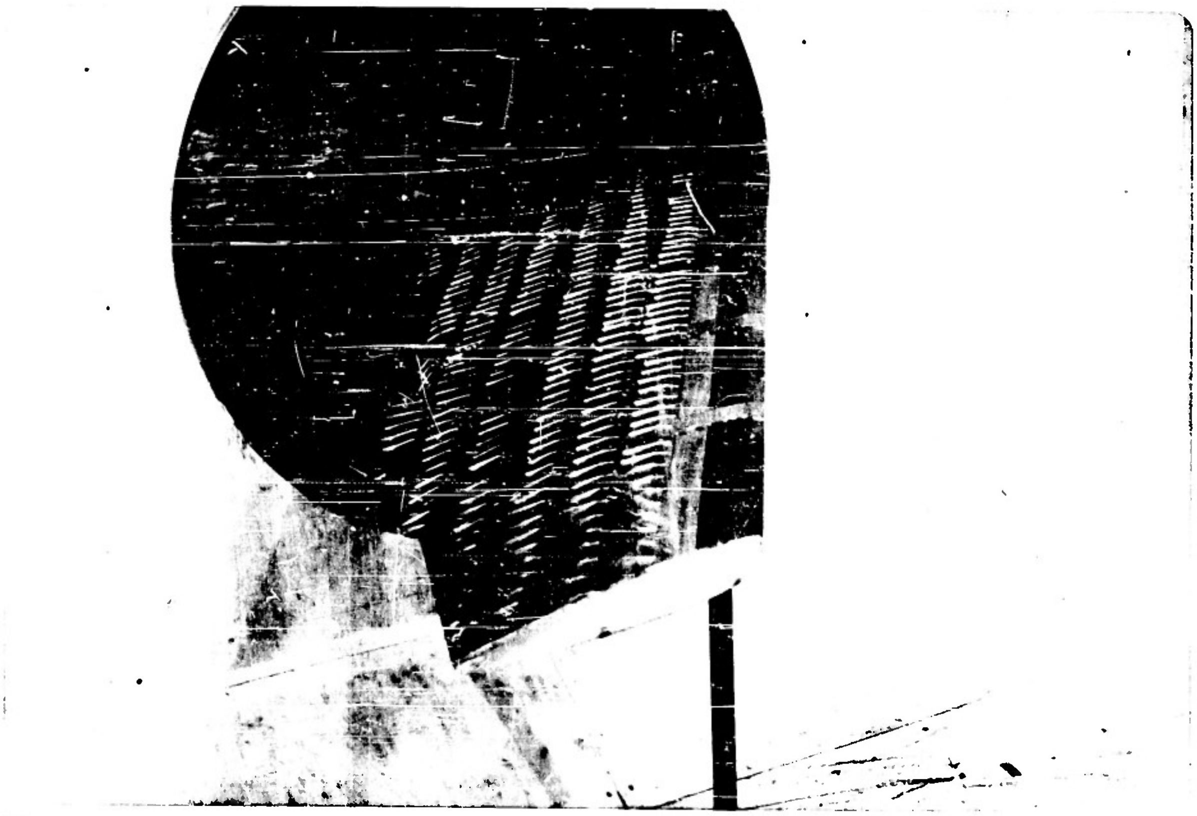


Figure 4.- Continued; $\alpha_t = 7°$.

Figure 4.- Continued; $\alpha_t = 8°$.

Figure 4.- Continued; $\alpha_t = 9°$.

Figure 4.- Continued; $\alpha_t = 10°$.

Figure 4.- Continued; $\alpha_t = 11°$.

Figure 4.- Continued; $\alpha_t = 12°$.

Figure 4.- Continued; $\alpha_t = 13°$.

Figure 4.- Continued; $\alpha_t = 14°$.

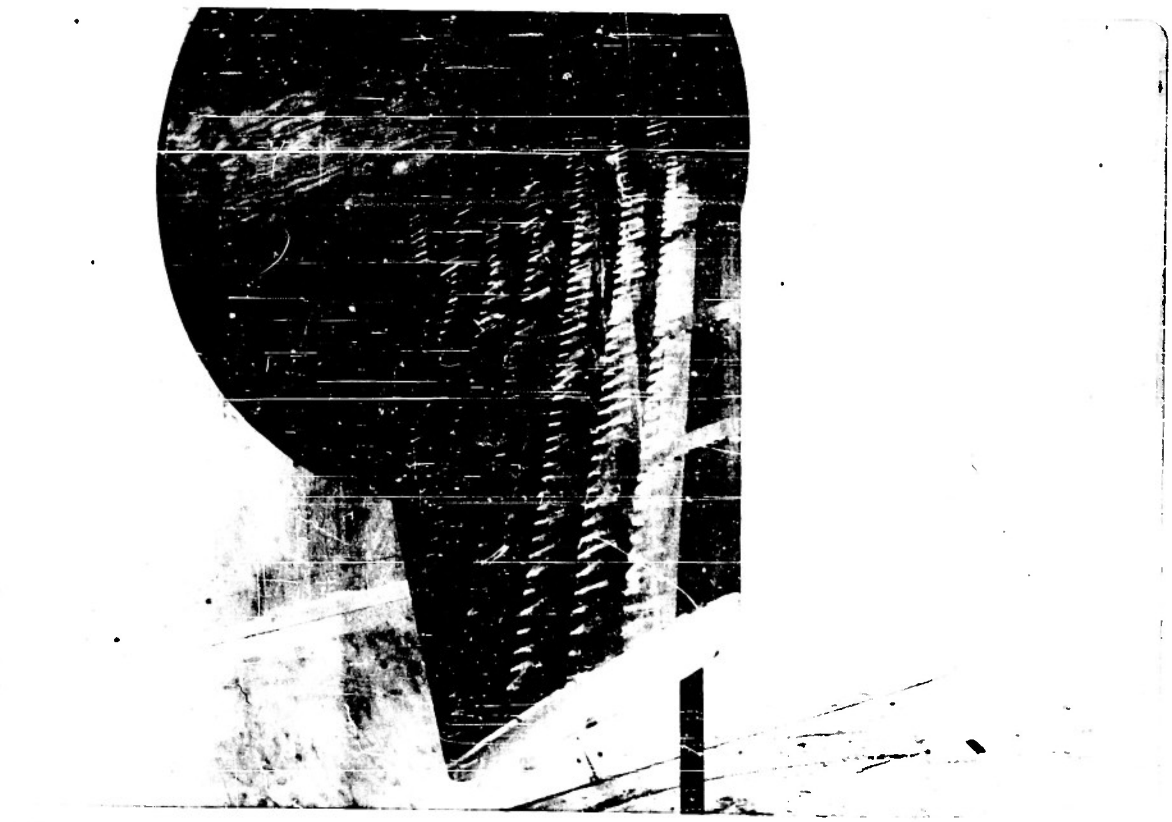


Figure 4.- Continued; $\alpha_t = 15°$.

Figure 4.- Continued; $\alpha_t = 16°$.

Figure 4.- Concluded; $\alpha_t = 18°$.

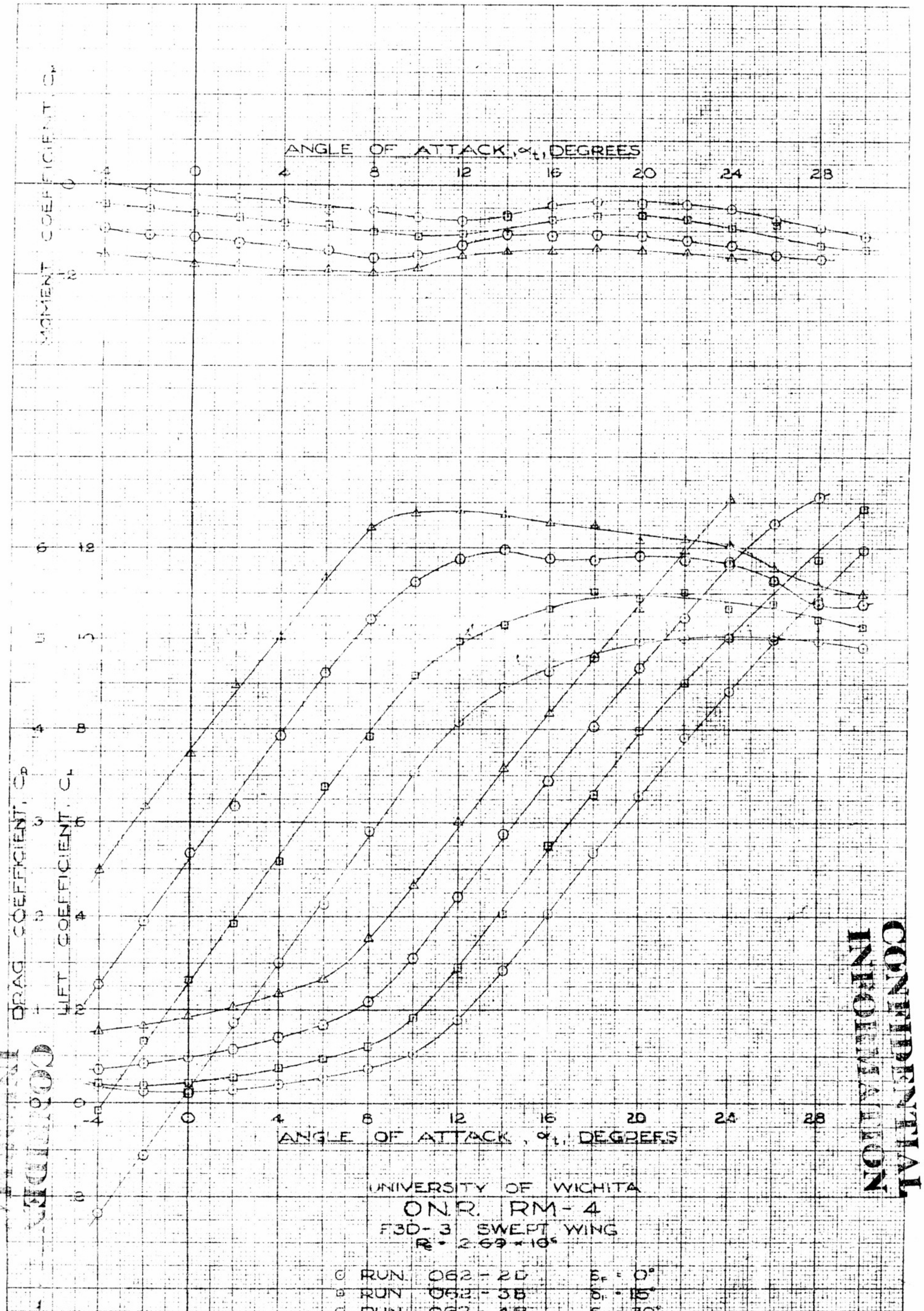


FIGURE 5

CONFIDENTIAL INFORMATION

CONFIDENTIAL INFORMATION

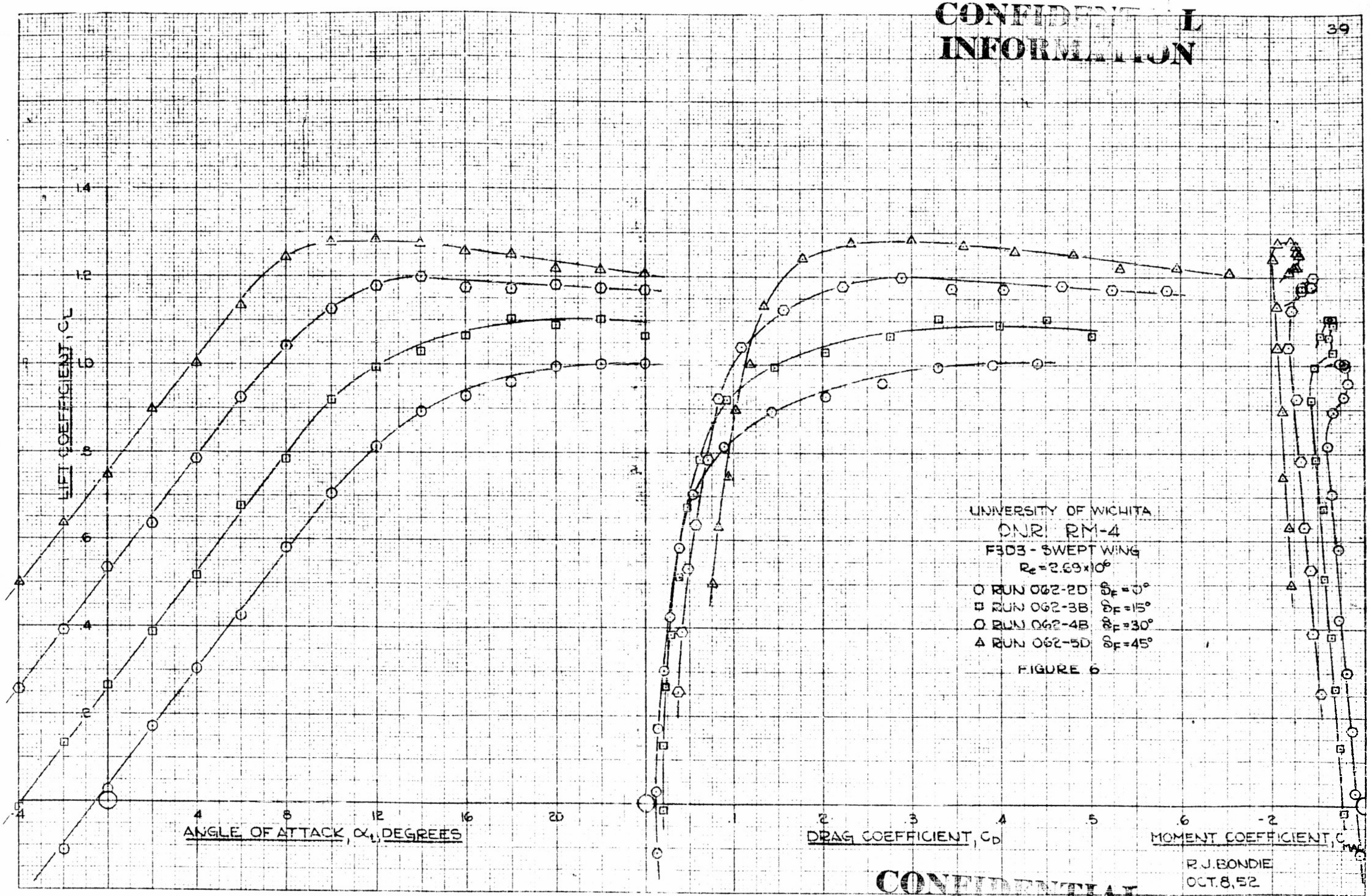


FIGURE 6

CONFIDENTIAL INFORMATION

CONFIDENTIAL
INFORMATION

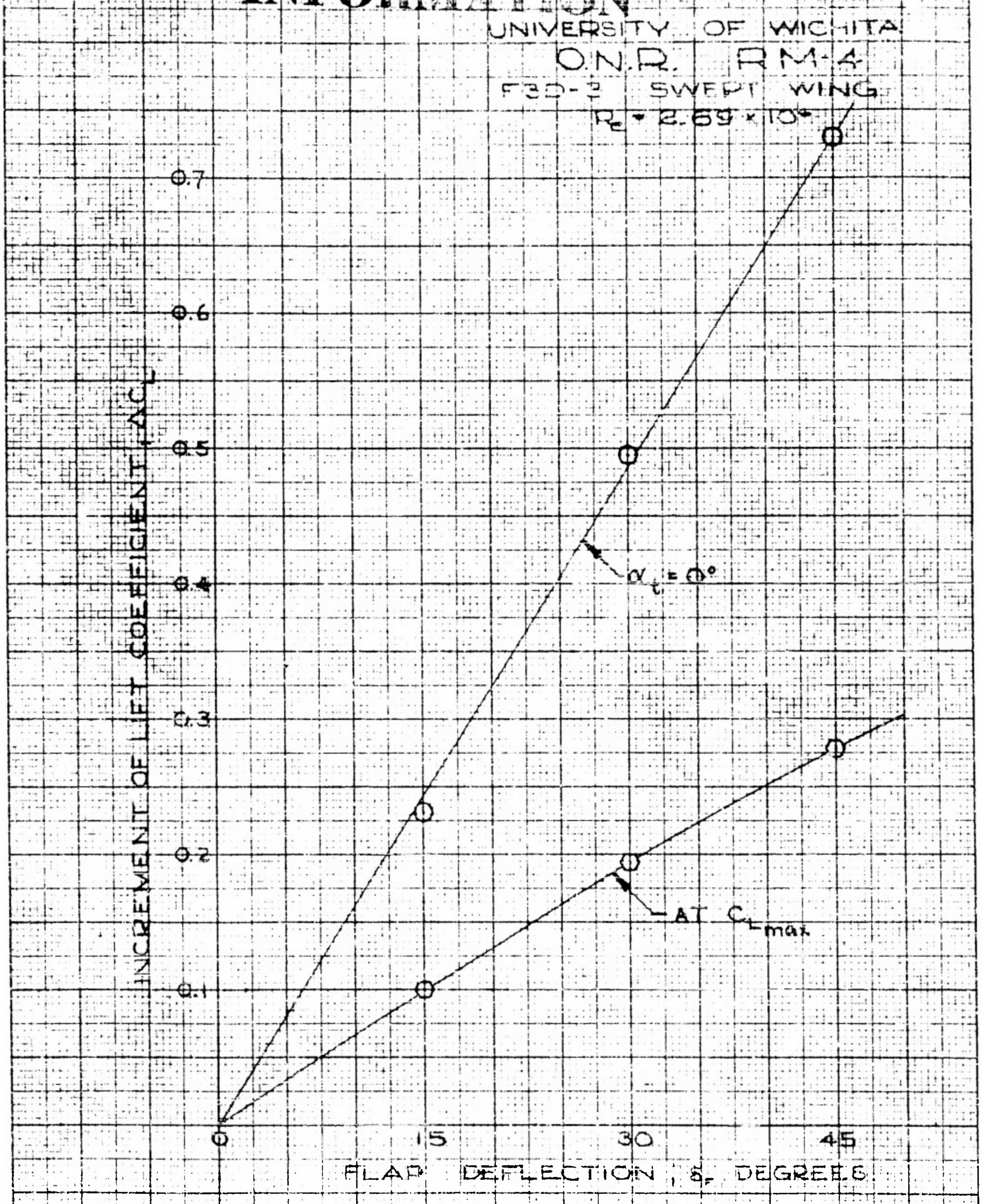


Figure 7.- Lift increment as a function of flap angle.

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

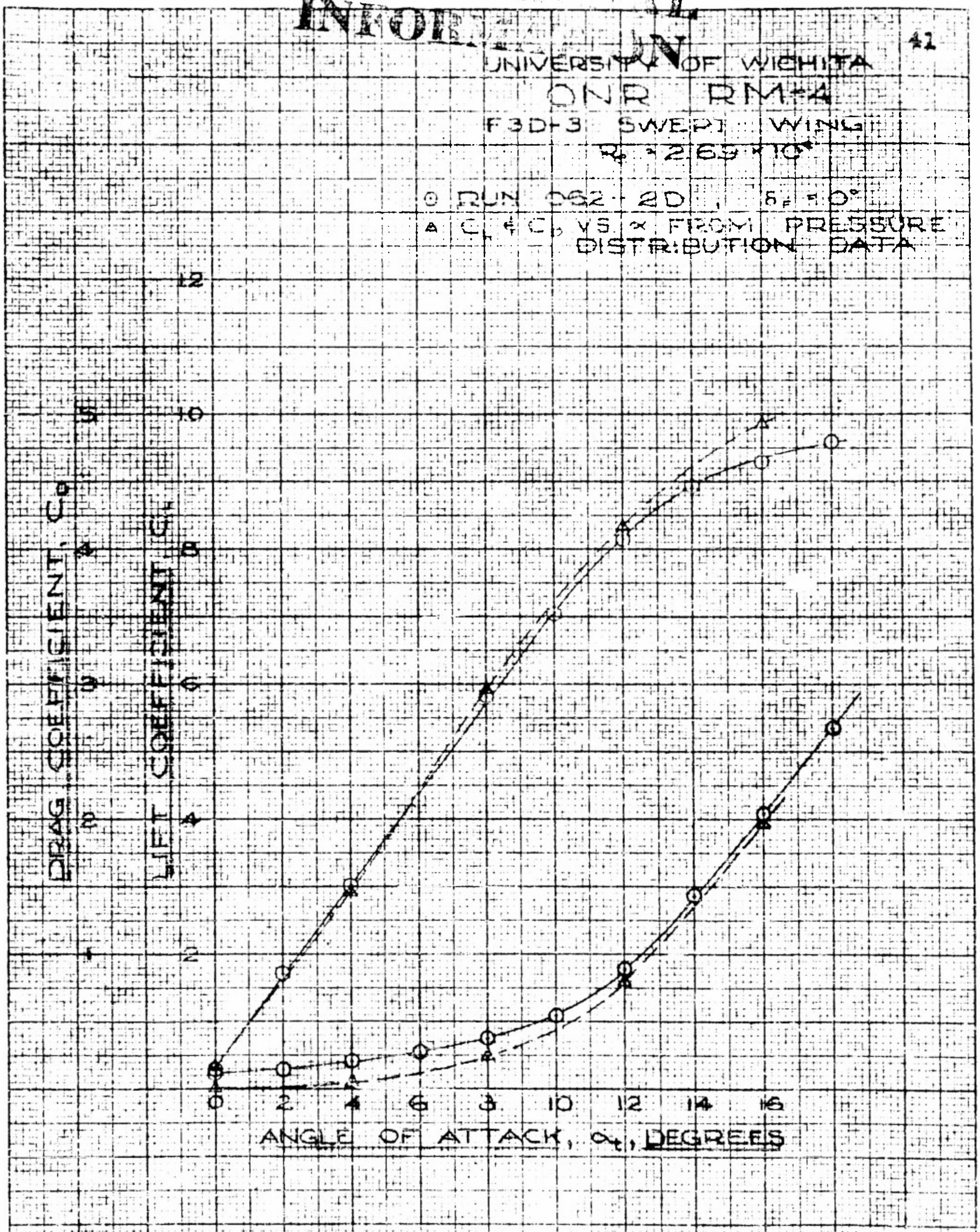


Figure 8.- Comparison of measured force-coefficient curves with the integrated pressure distribution force coefficients.

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

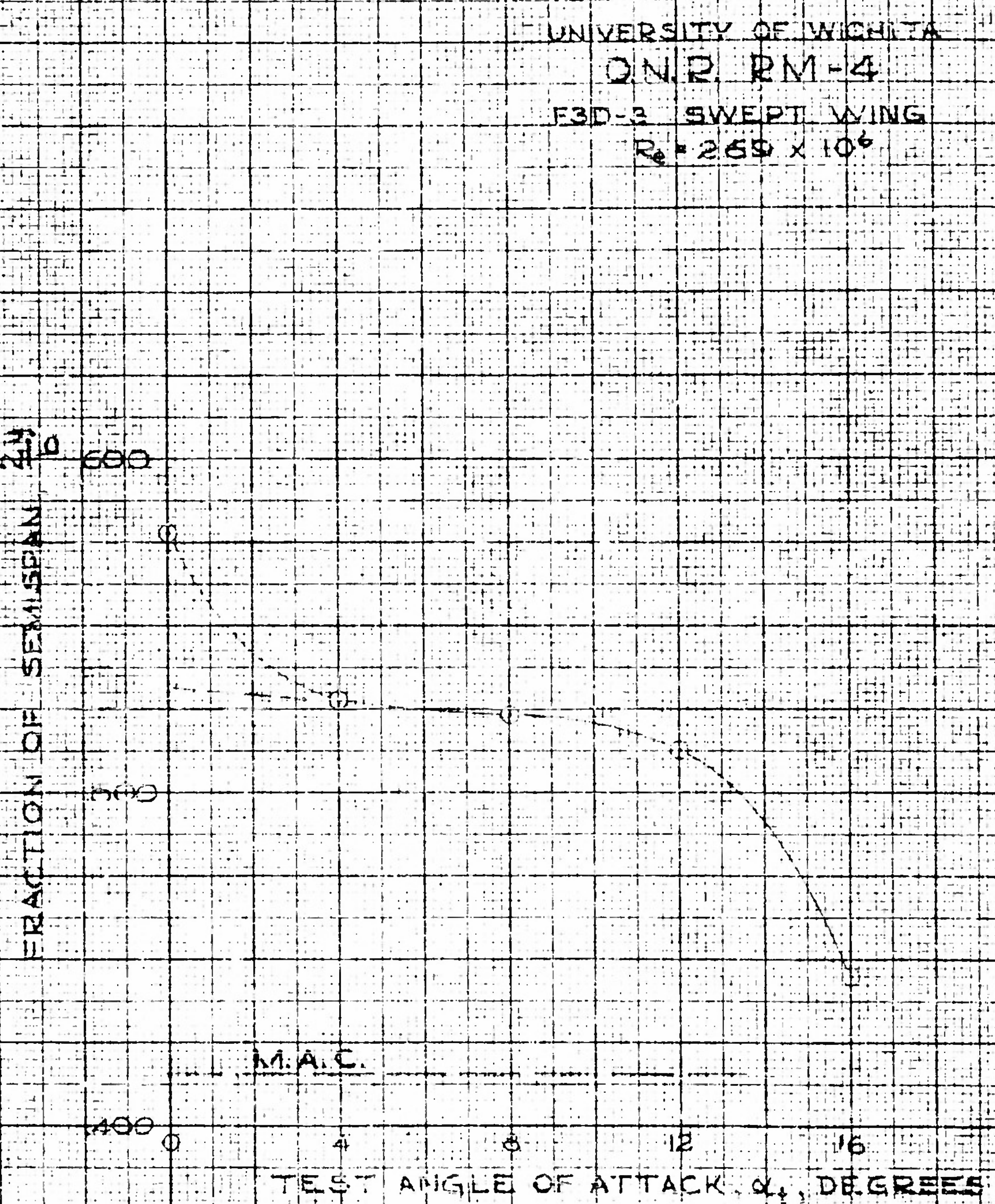


Figure 9.- Center of lift as a function of test angle of attack.

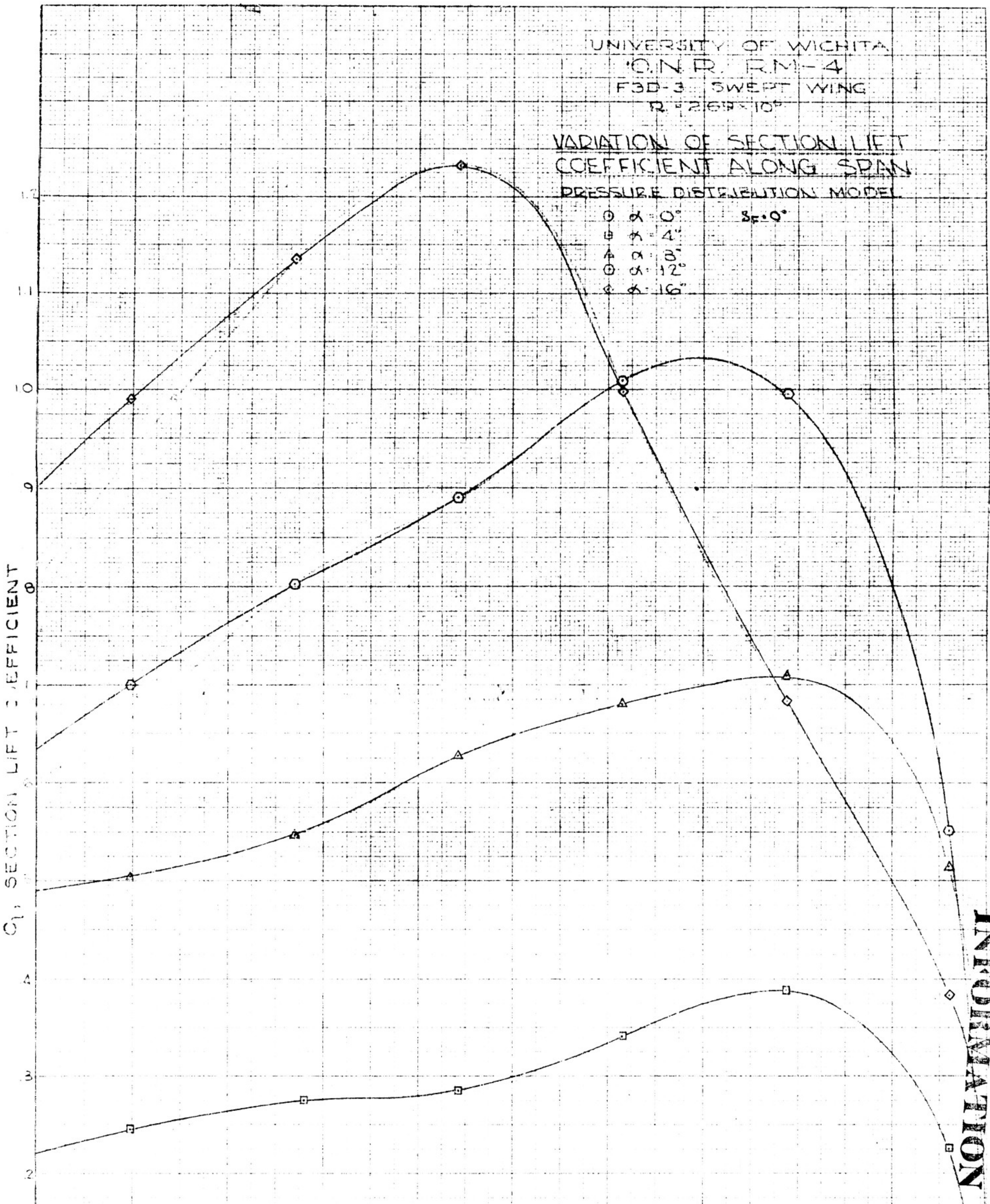


FIGURE 10A

STALTER
6-30-52

CONFIDENTIAL INFORMATION

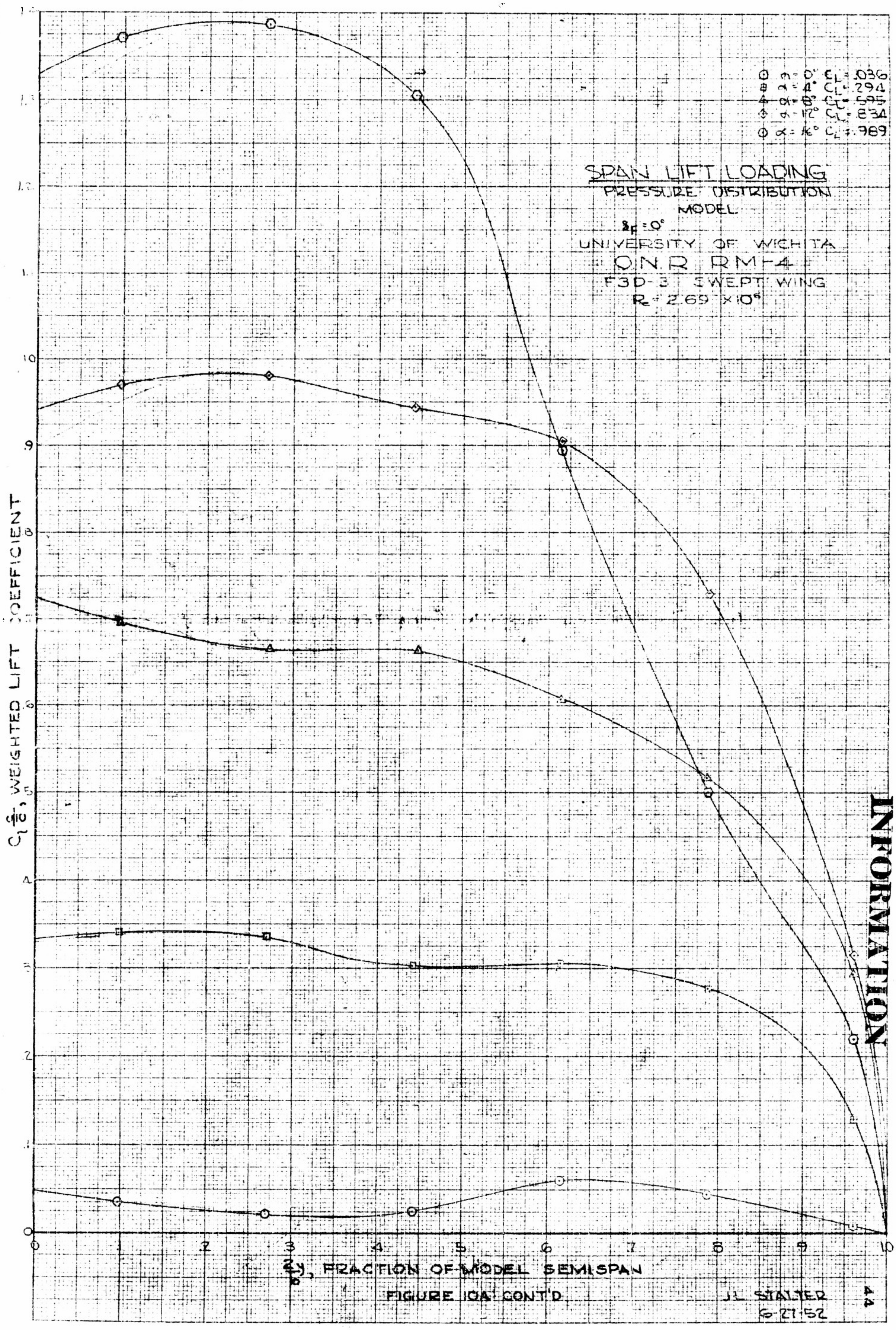
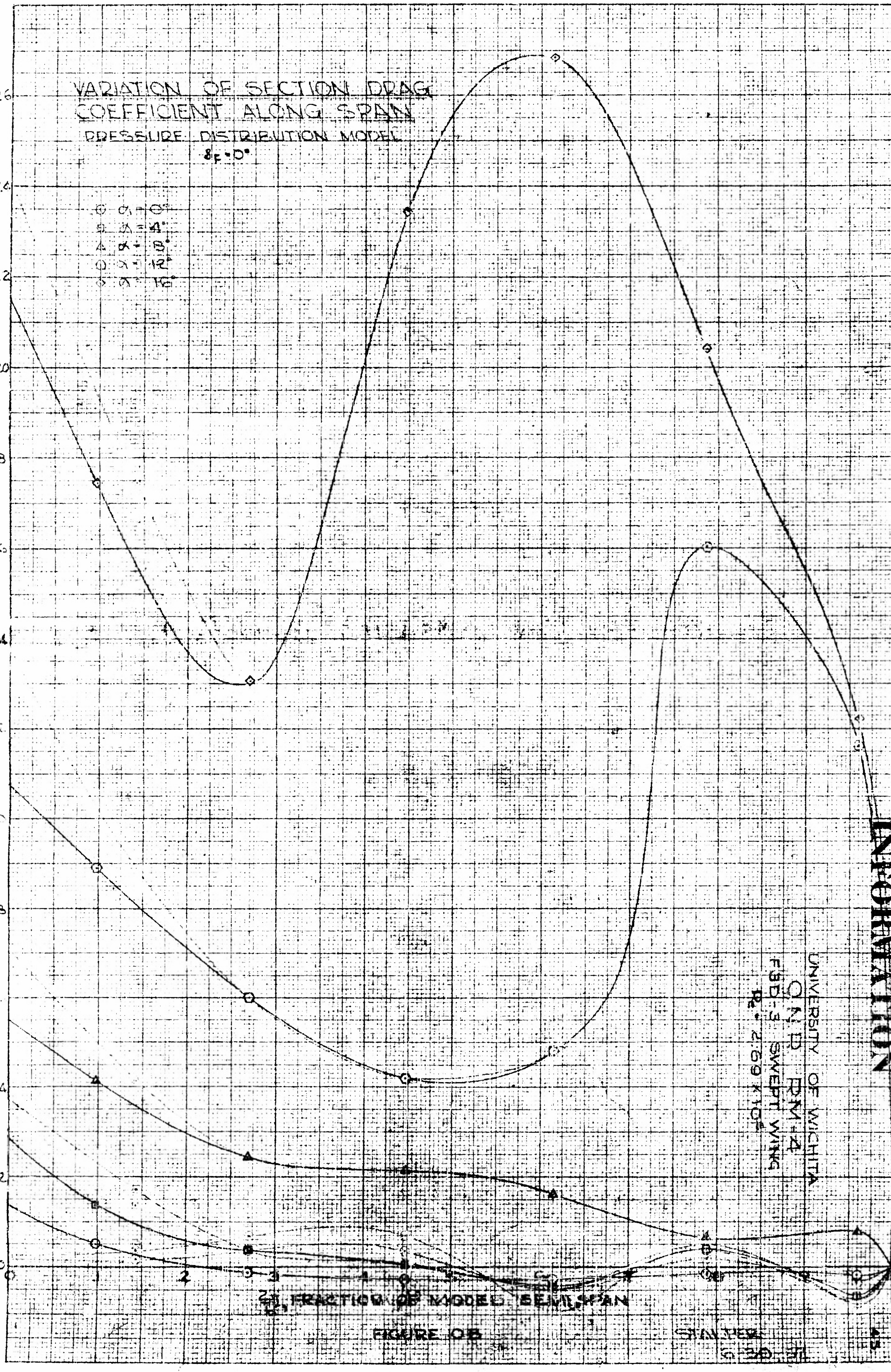


FIGURE 10A CONT'D

CONFIDENTIAL INFORMATION



CONFIDENTIAL
INFORMATION

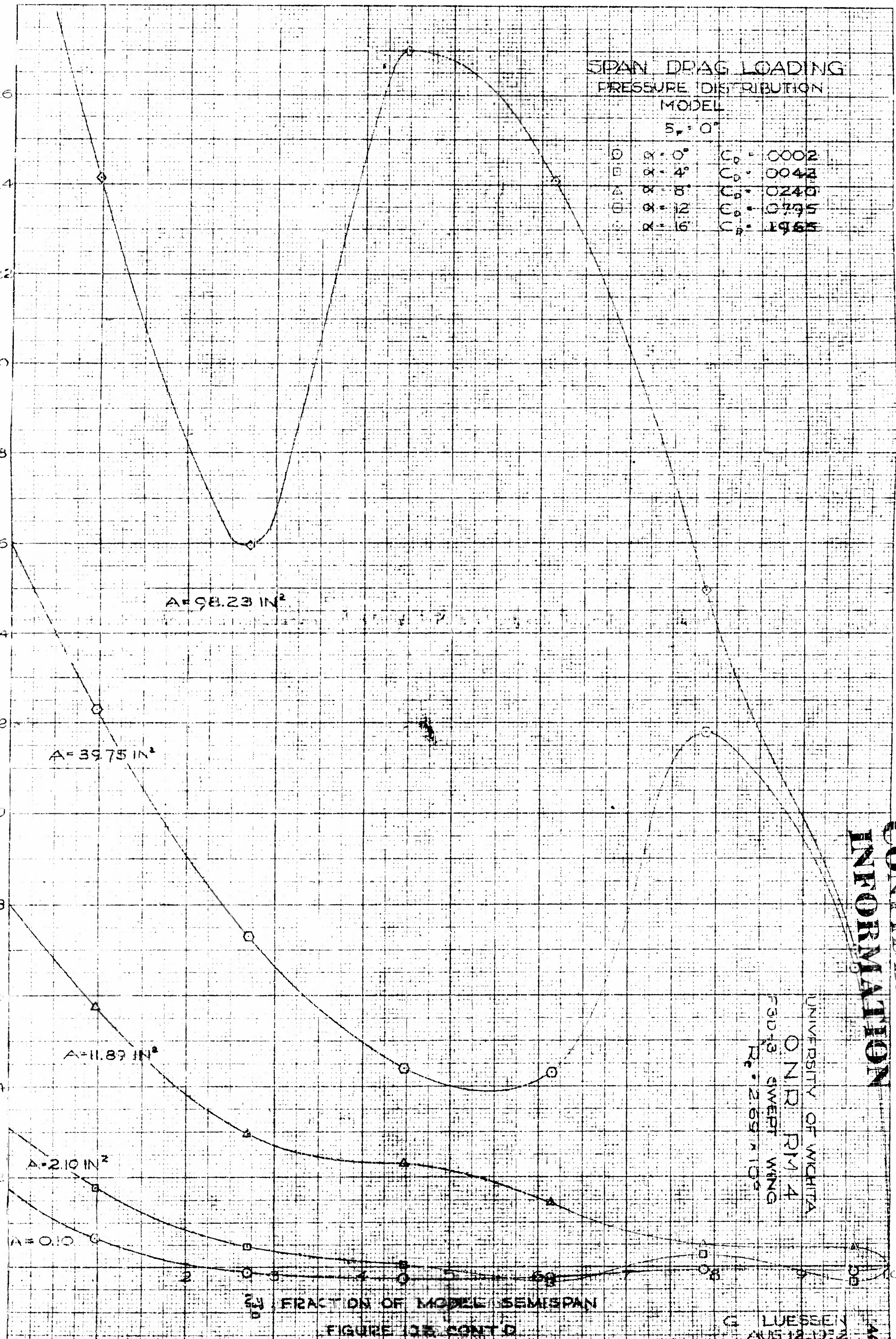
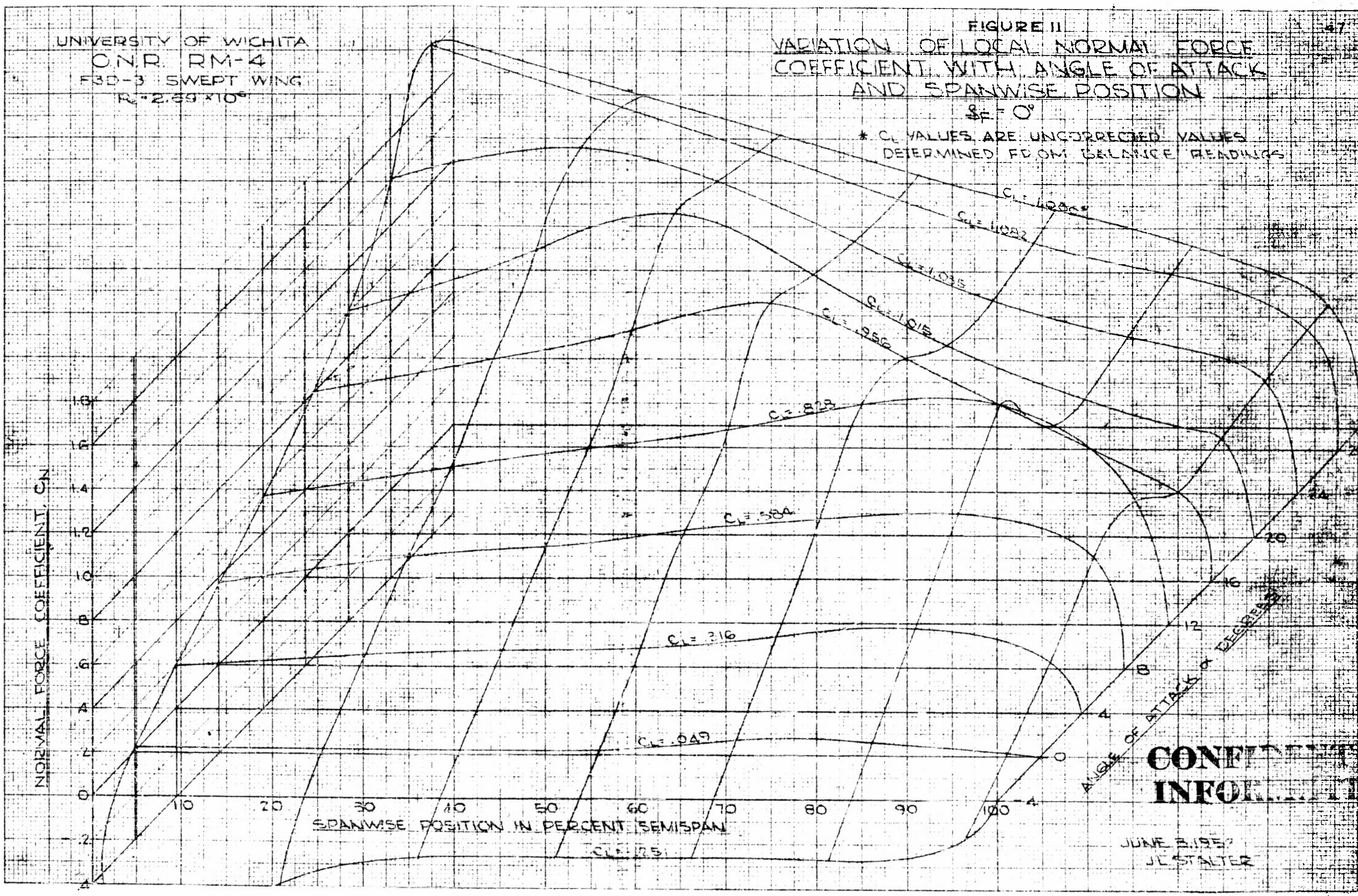


FIGURE [illegible] CONT'D


UNIVERSITY OF WICHITA
O.N.R. RM-4
F3D-3 SWEPT WING
FIGURE II
VARIATION OF LOCAL NORMAL FORCE COEFFICIENT WITH ANGLE OF ATTACK AND SPANWISE POSITION
$\delta_F = 0°$
* C_L VALUES ARE UNCORRECTED VALUES DETERMINED FROM BALANCE READINGS
$C_L = 1.082$
$C_L = 1.035$
$C_L = 1.015$
$C_L = .956$
$C_L = .828$
$C_L = .584$
$C_L = .316$
$C_L = .049$
NORMAL FORCE COEFFICIENT C_N
SPANWISE POSITION IN PERCENT SEMISPAN
ANGLE OF ATTACK α DEGREES
JUNE 3, 1952
J.L. STALTER

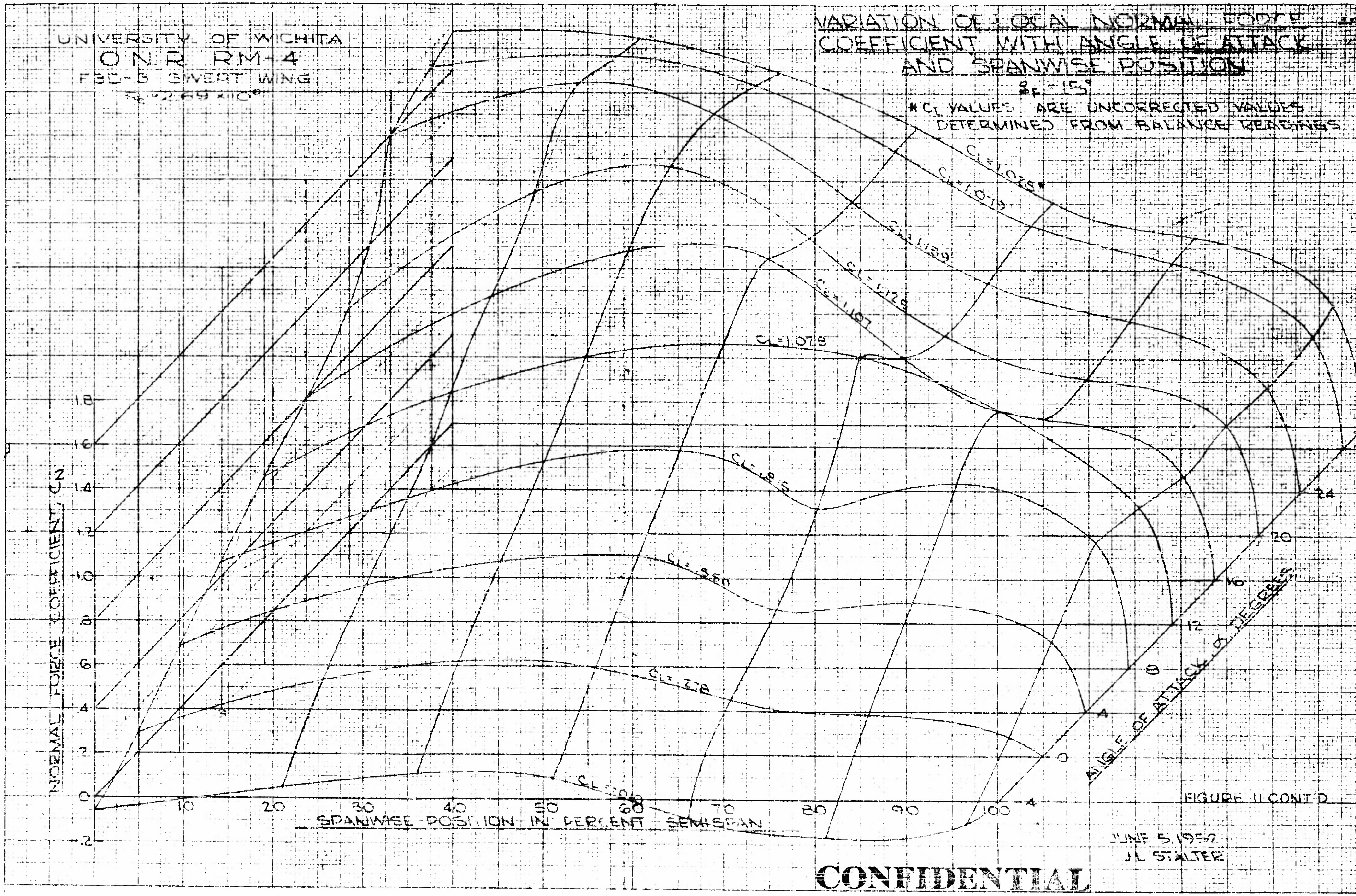
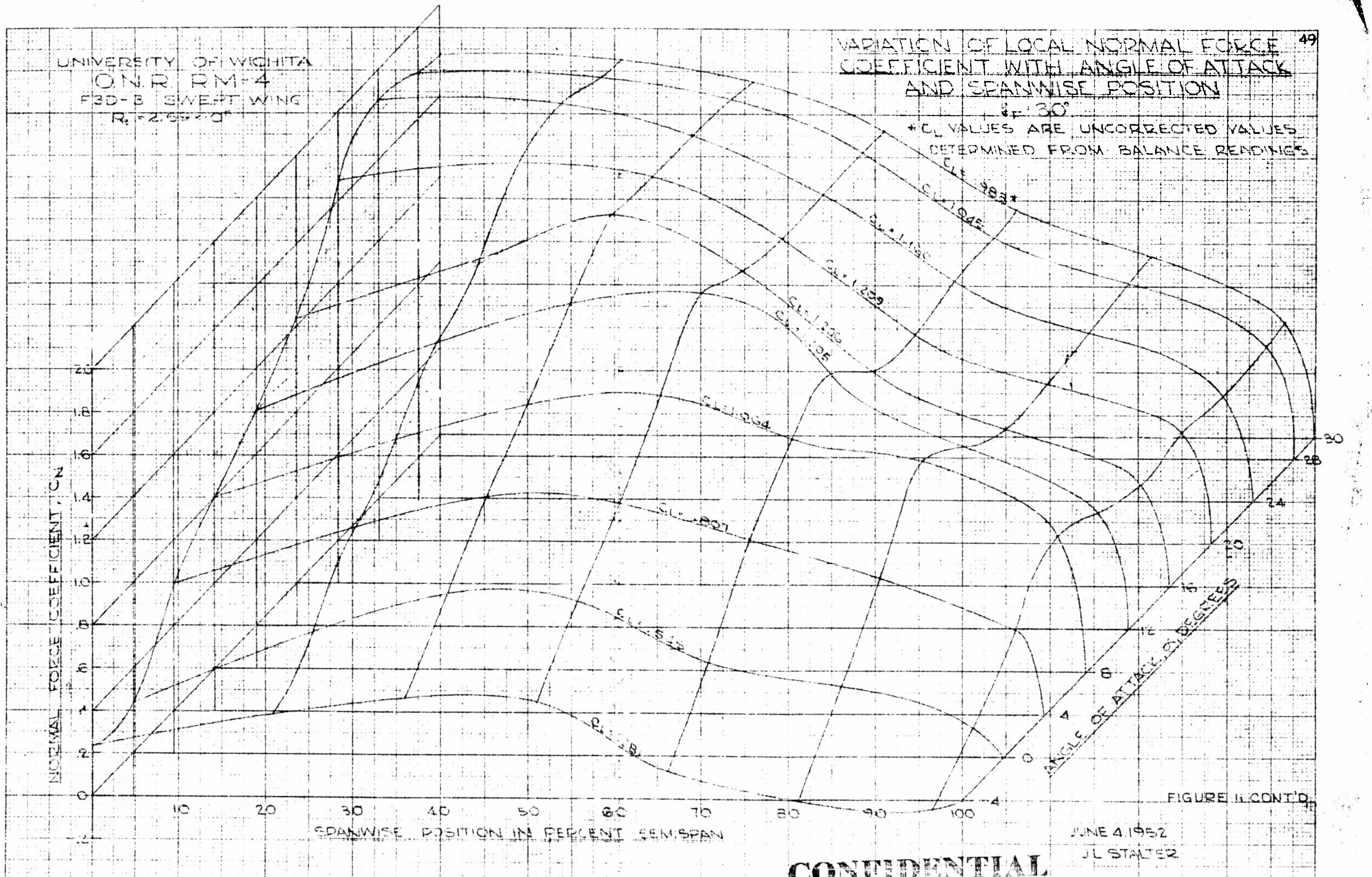


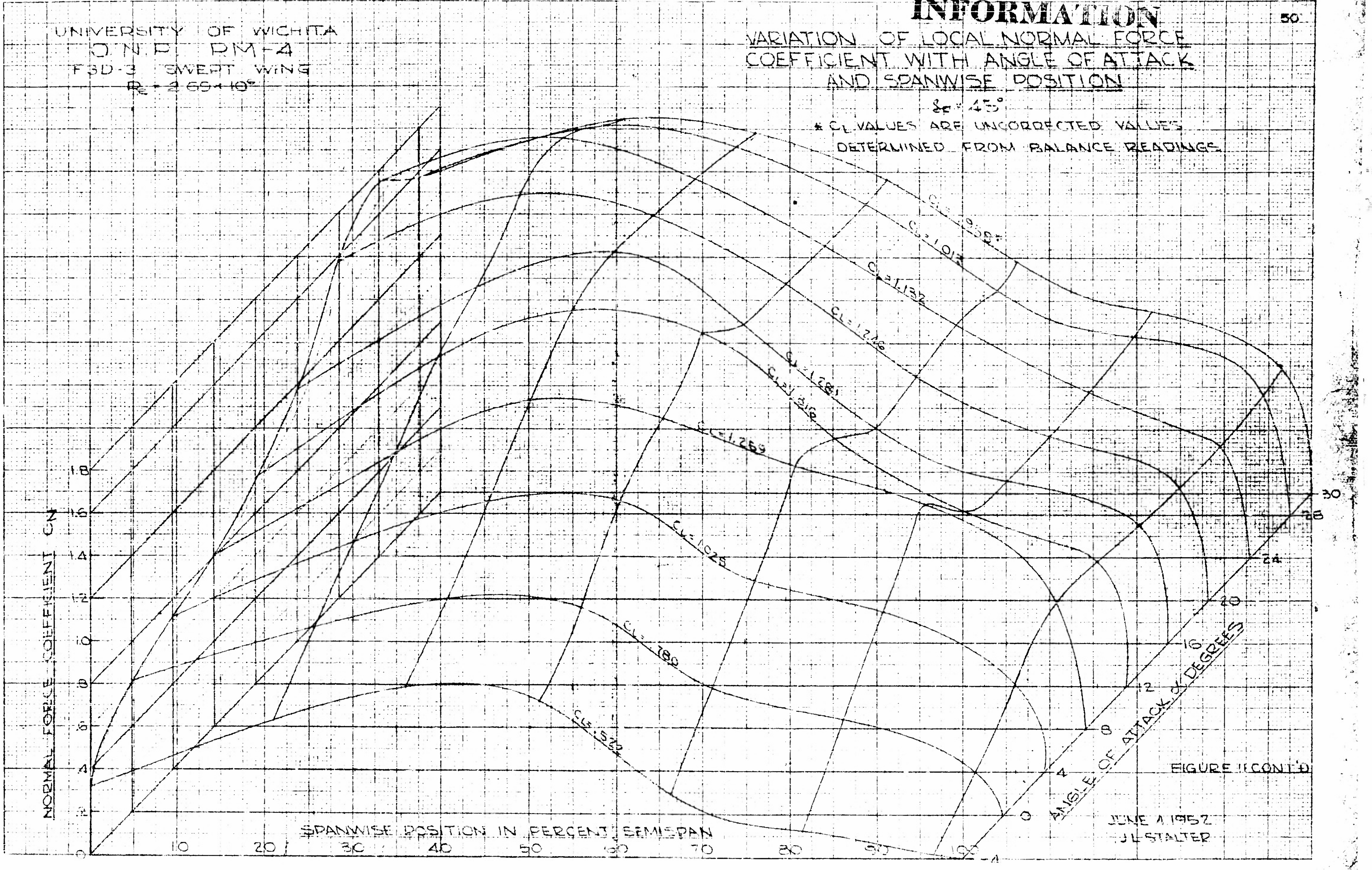
FIGURE 11 CONT'D

CONFIDENTIAL
INFORMATION



CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION



CONFIDENTIAL
INFORMATION

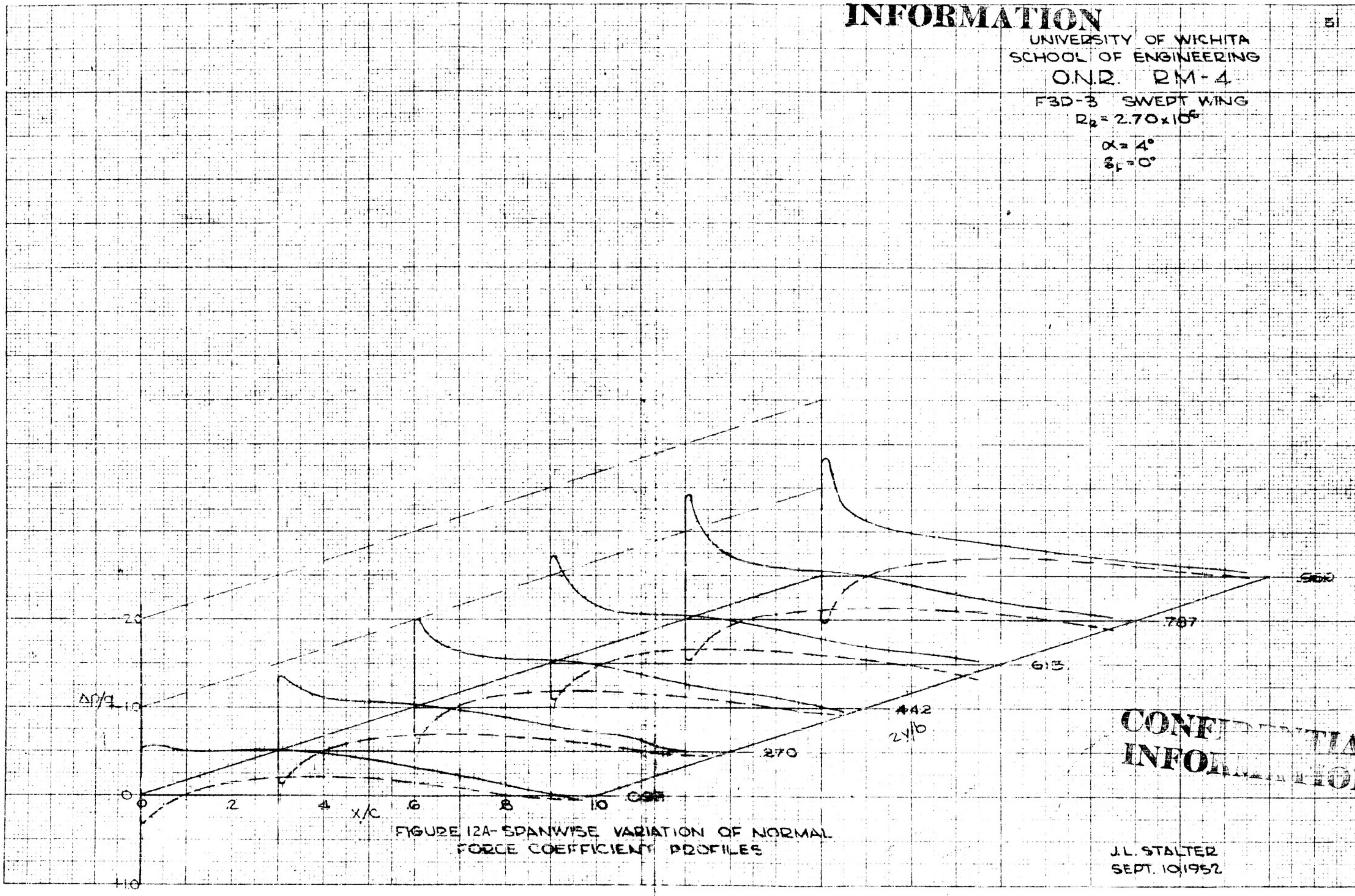


FIGURE 12A - SPANWISE VARIATION OF NORMAL FORCE COEFFICIENT PROFILES

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

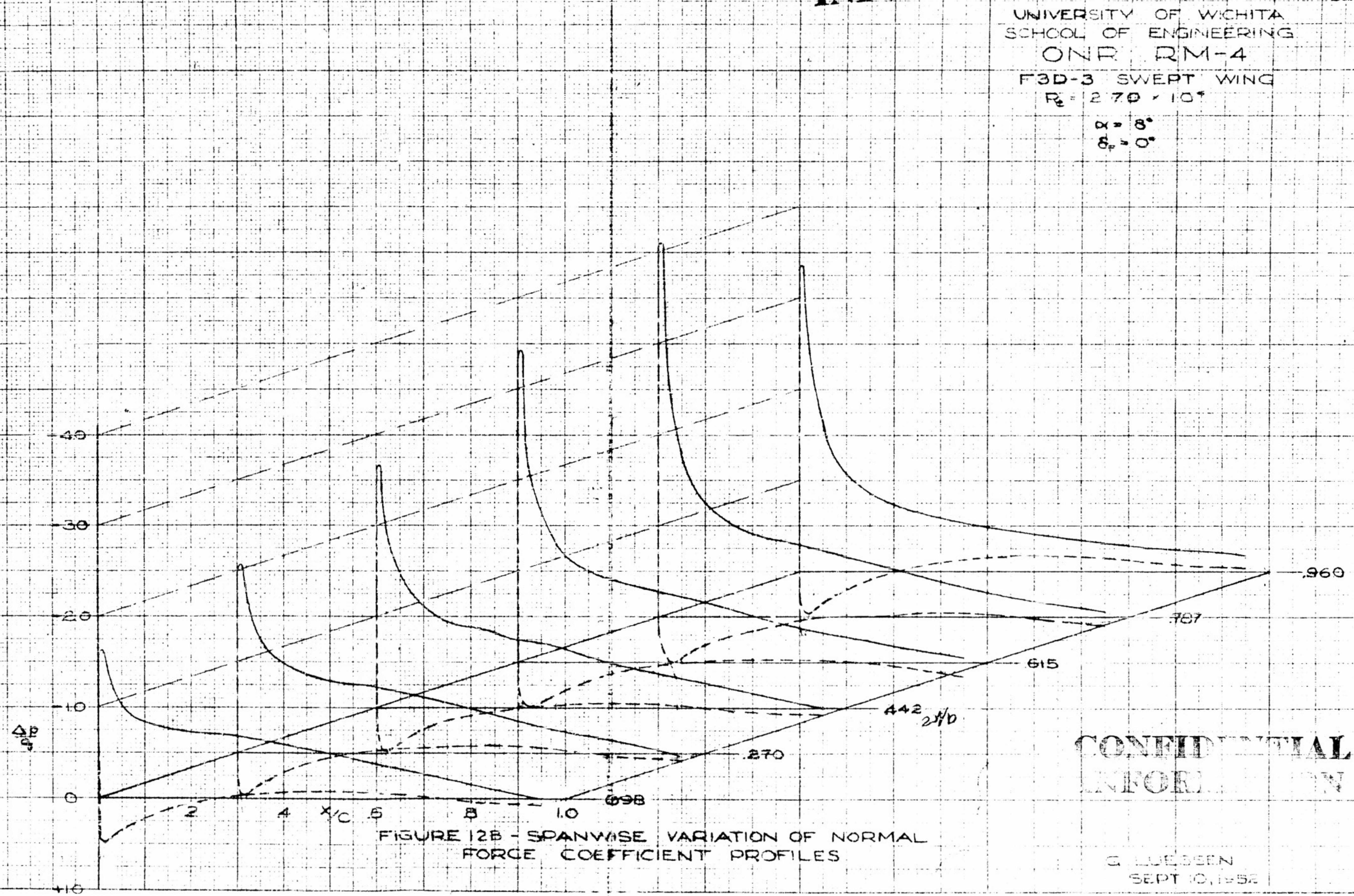


FIGURE 12B - SPANWISE VARIATION OF NORMAL FORCE COEFFICIENT PROFILES

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

UNIVERSITY OF WICHITA
SCHOOL OF ENGINEERING
ONR RM-4

F3D-3 SWEPT WING
$R_e = 270 \times 10^6$

$\alpha = 12°$
$\delta_F = 0°$

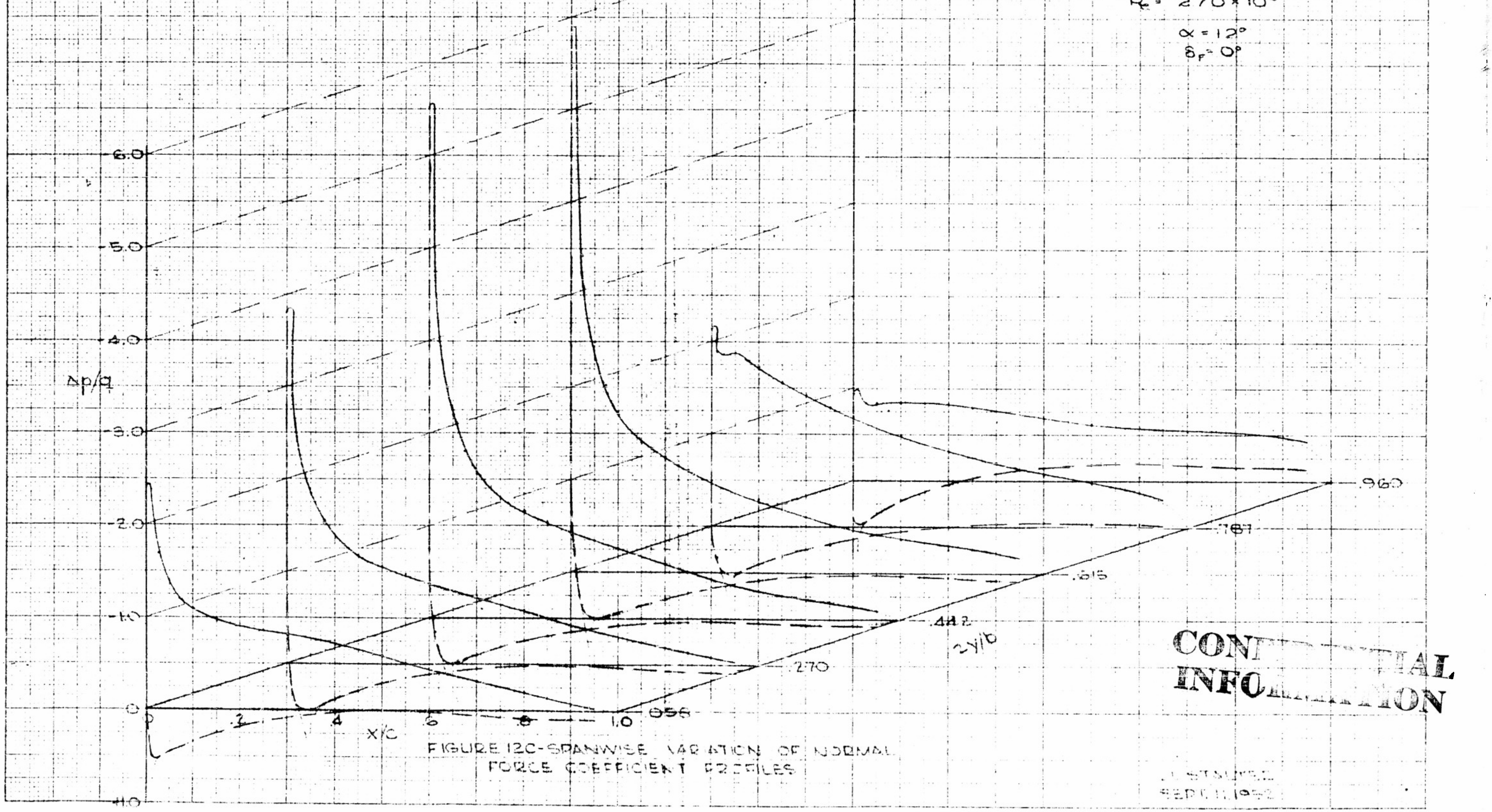


FIGURE 12C-SPANWISE VARIATION OF NORMAL FORCE COEFFICIENT PROFILES

CONFIDENTIAL
INFORMATION

J. STAUFFER
SEPT 11, 1952

CONFIDENTIAL
INFORMATION

UNIVERSITY OF WICHITA
SCHOOL OF ENGINEERING
ONR RM-4

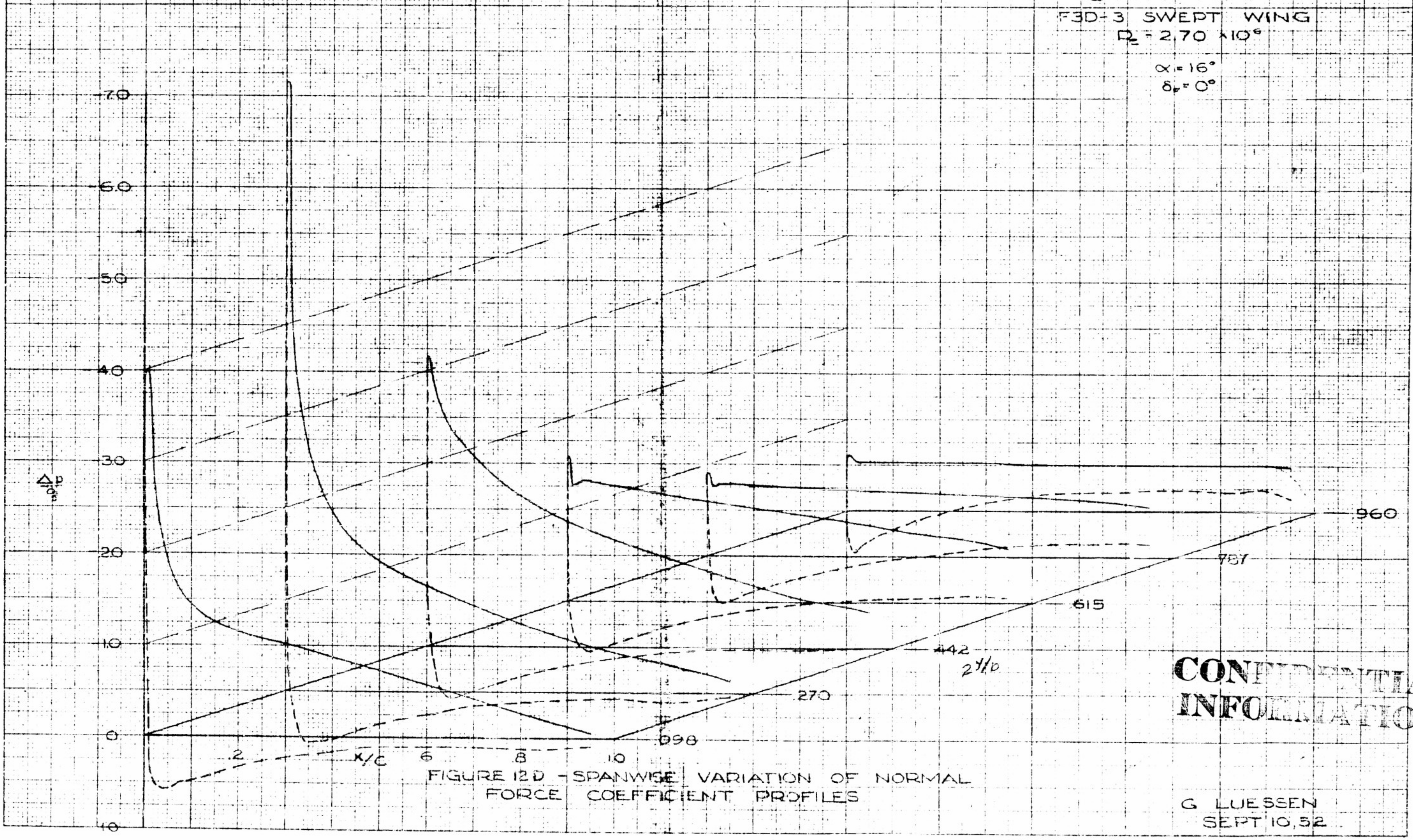


FIGURE 12 D - SPANWISE VARIATION OF NORMAL FORCE COEFFICIENT PROFILES

G. LUESSEN
SEPT 10, 52

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

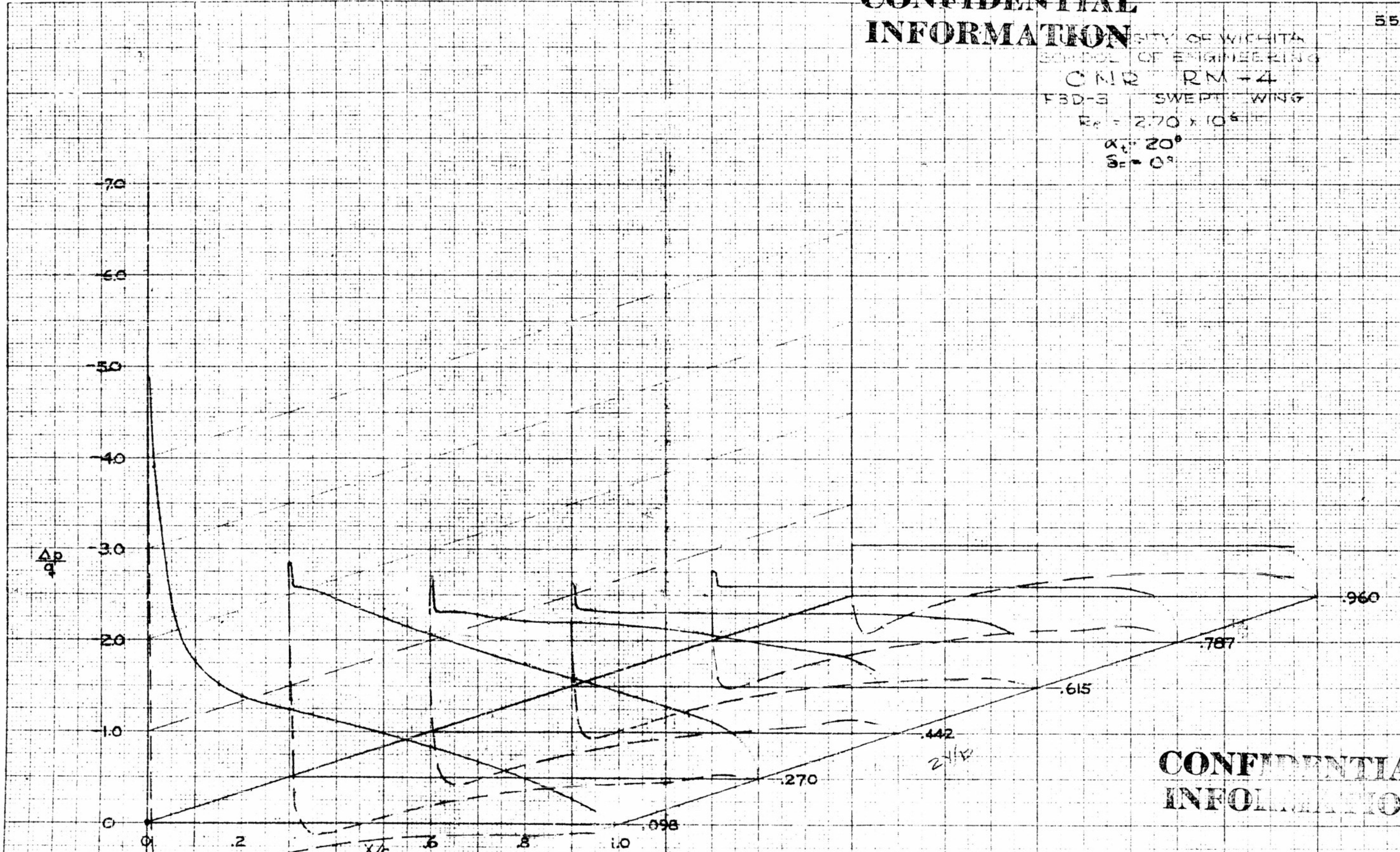
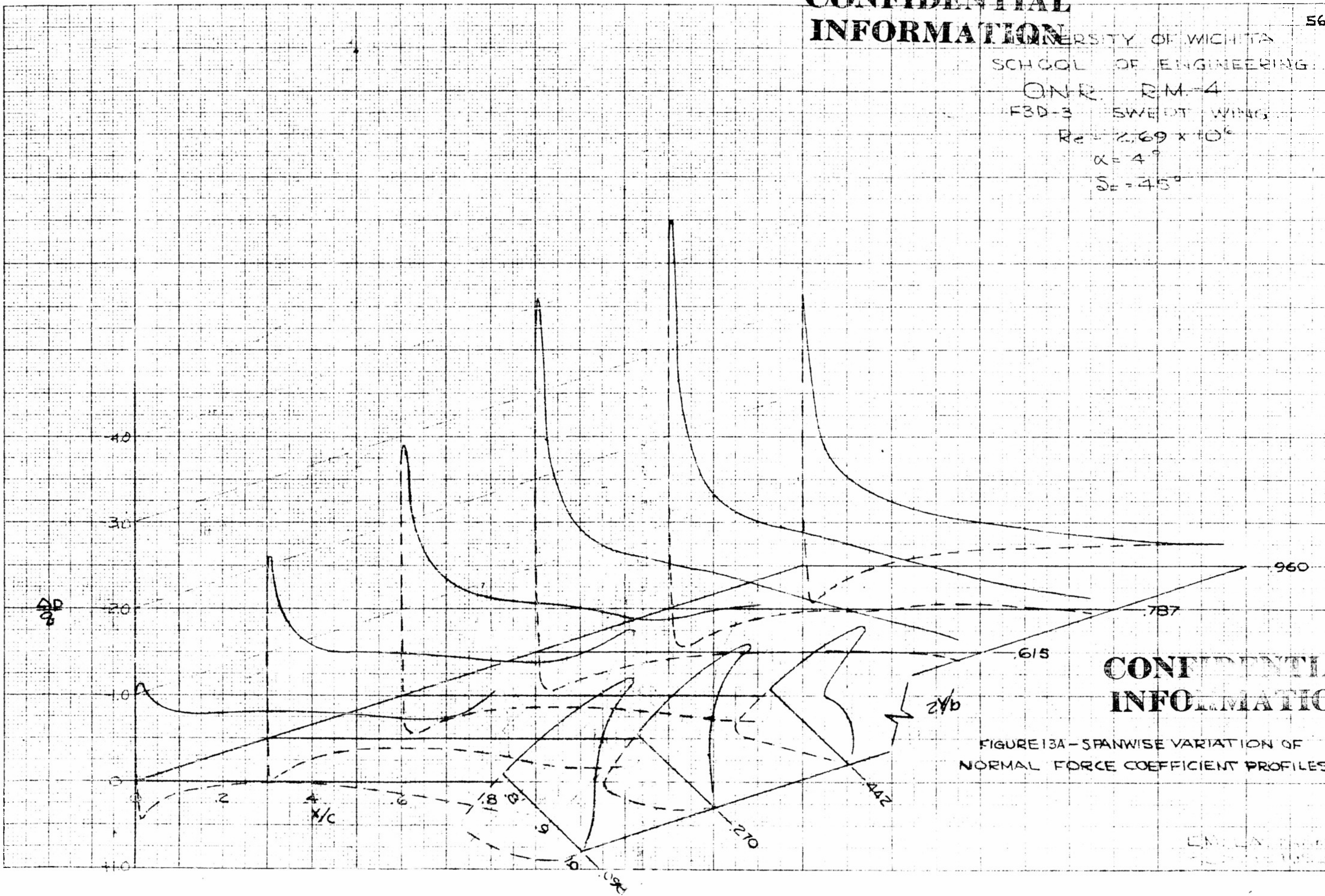


FIGURE 12E—SPANWISE VARIATION OF NORMAL FORCE COEFFICIENT PROFILES

CONFIDENTIAL
INFORMATION

CONFIDENTIAL INFORMATION



CONFIDENTIAL INFORMATION

FIGURE 13A – SPANWISE VARIATION OF NORMAL FORCE COEFFICIENT PROFILES

CONFIDENTIAL INFORMATION

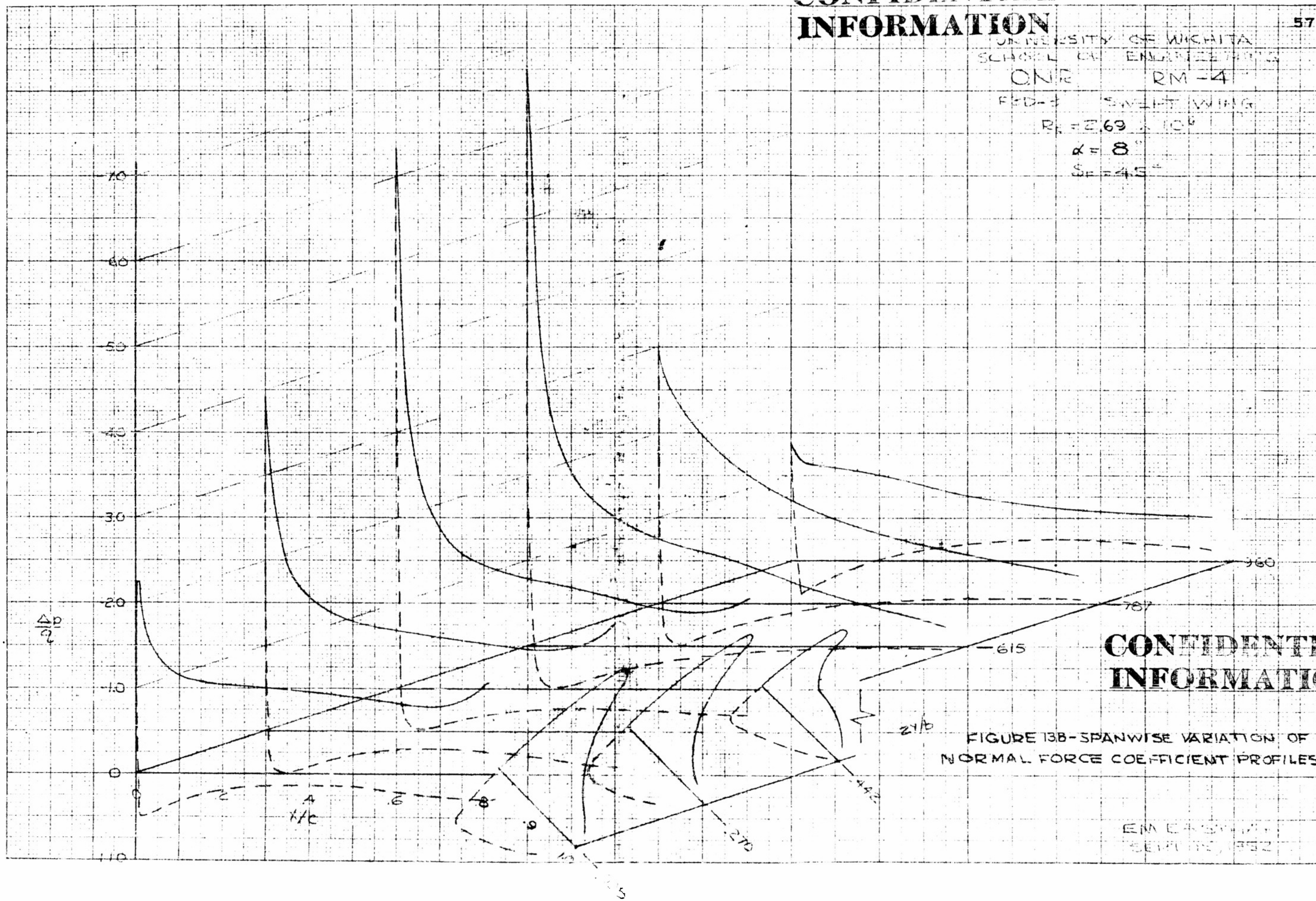
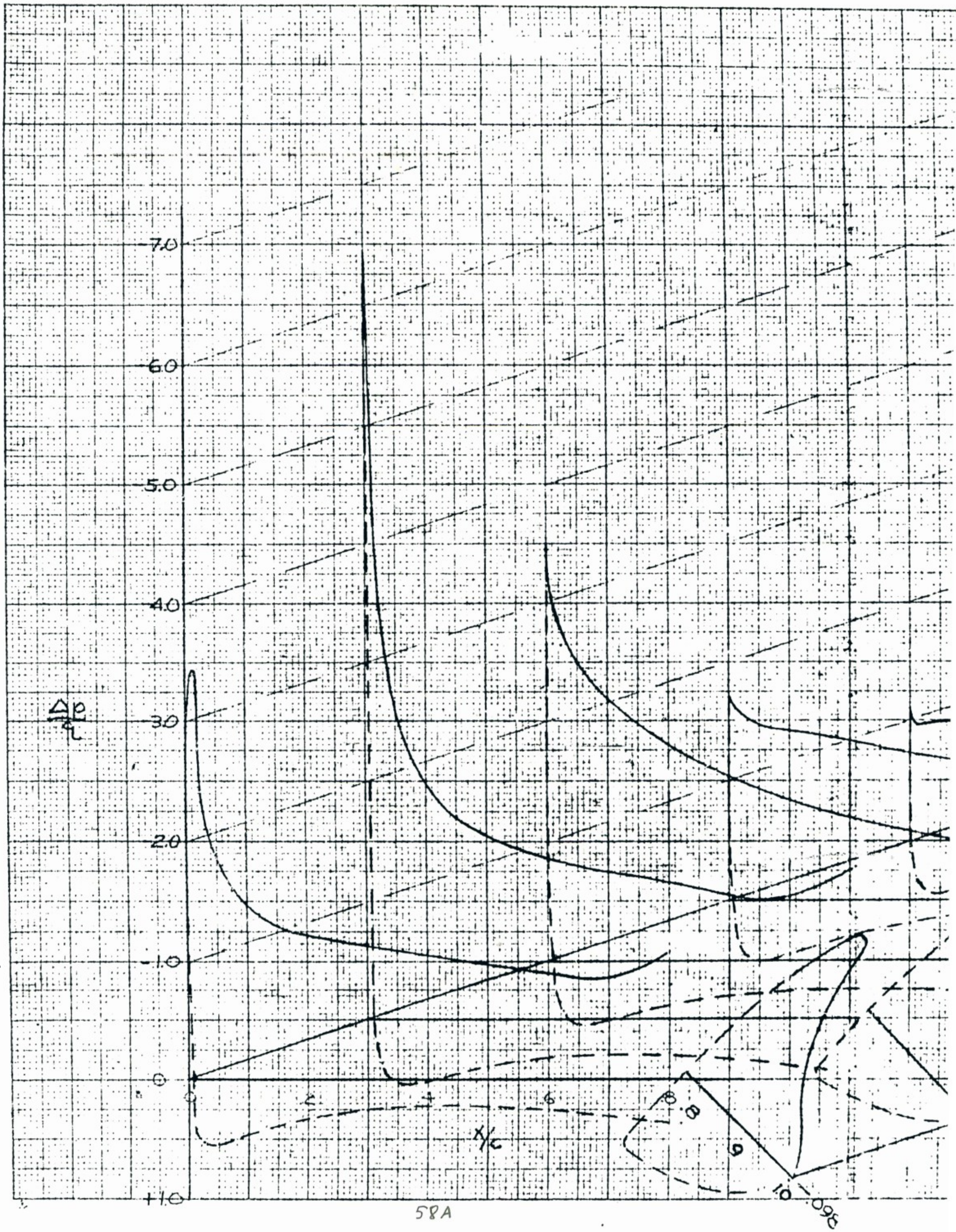


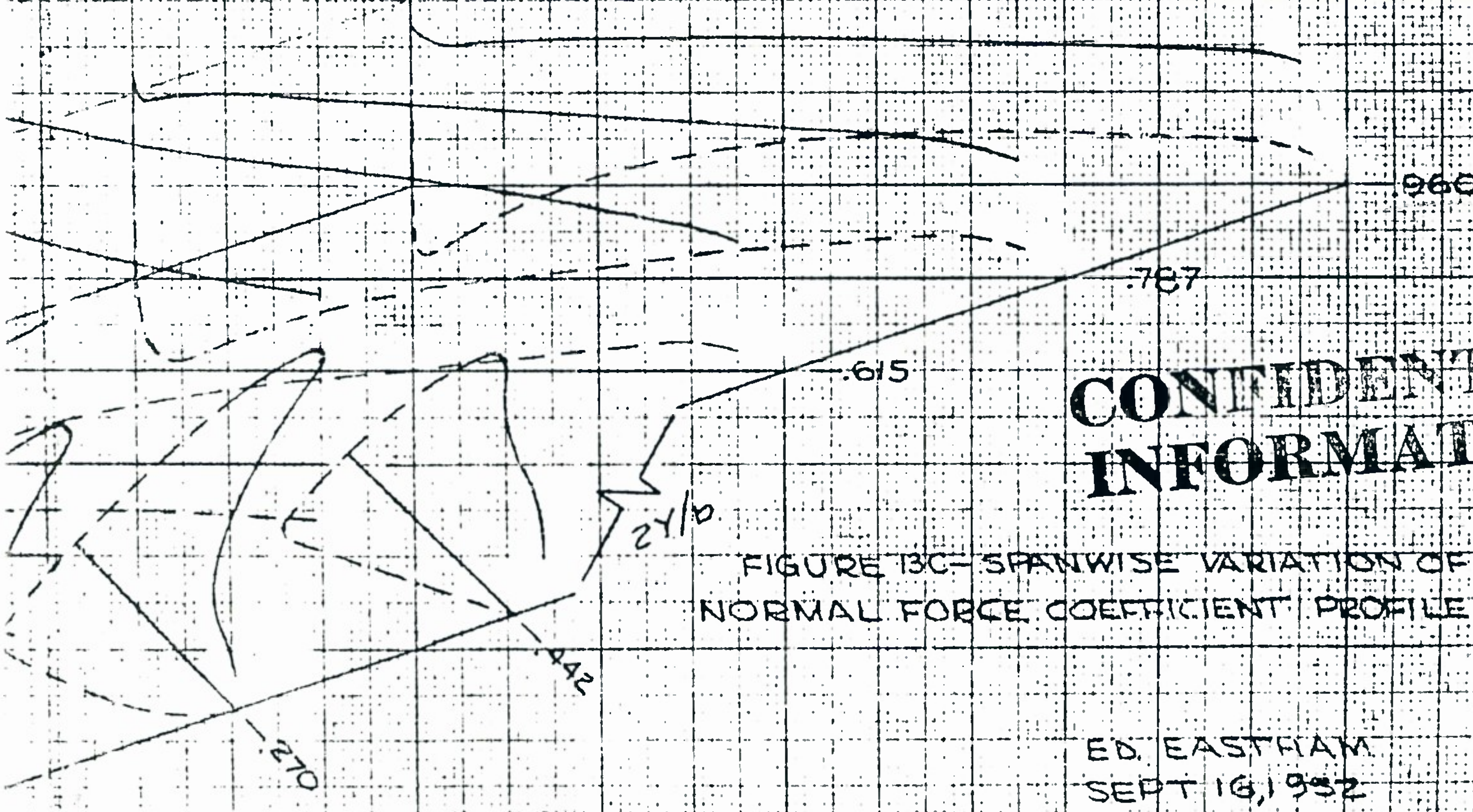
FIGURE 13B - SPANWISE VARIATION OF NORMAL FORCE COEFFICIENT PROFILES

CONFIDENTIAL INFORMATION


7.0
6.0
5.0
4.0
3.0
$\frac{\Delta p}{q}$
2.0
1.0
0
+1.0
.2
.4
.6
.8
x/c
.8
.9
1.0
.096

CONFIDENTIAL
INFORMATION

UNIVERSITY OF WICHITA
O.N.R. RM-4
F3D-3 SWEPT WING
$R_e = 2.69 \times 10^6$
$\alpha = 12°$
$\delta_f = 45°$



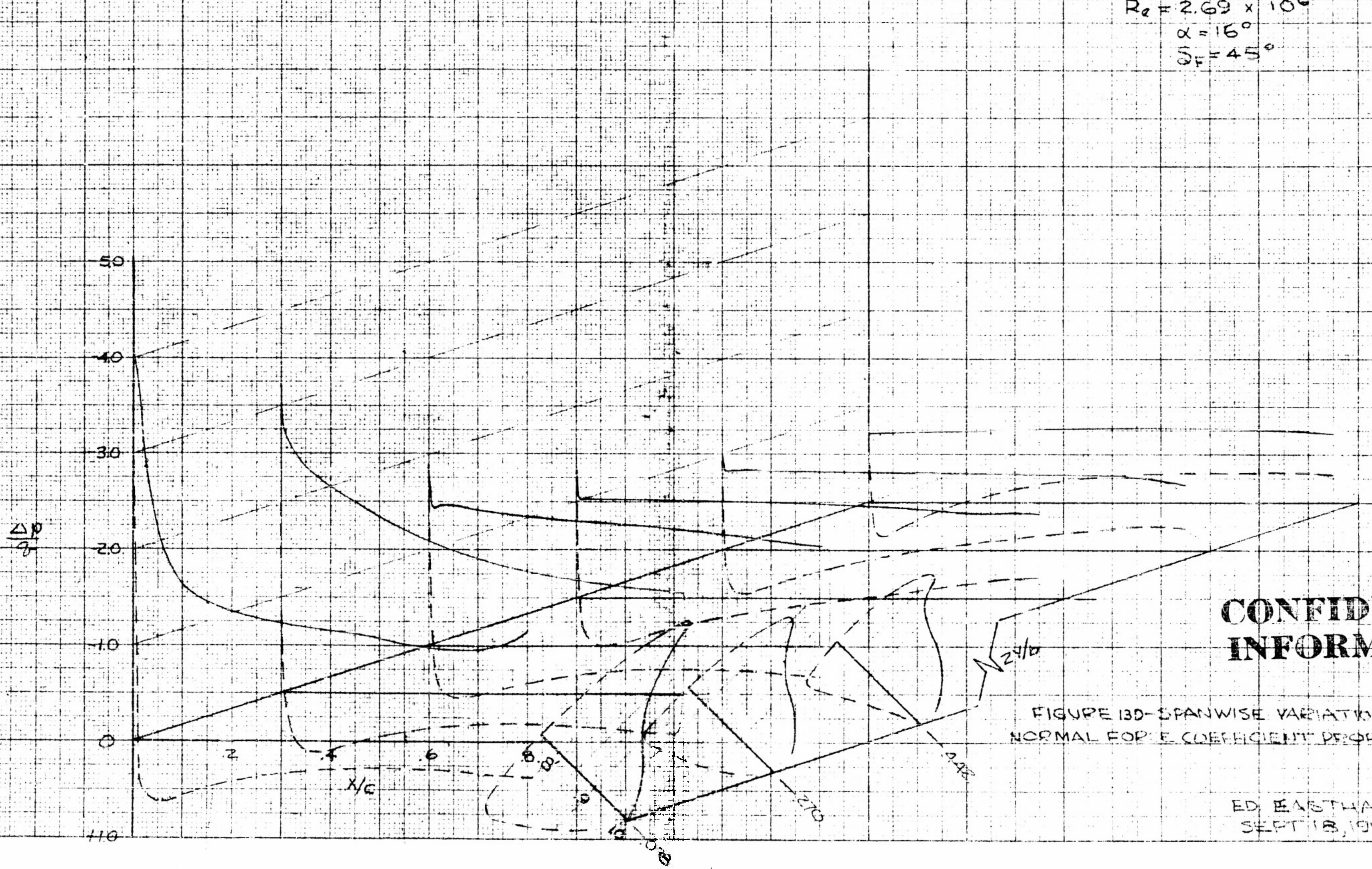
CONFIDENTIAL
INFORMATION

FIGURE 13C- SPANWISE VARIATION OF NORMAL FORCE COEFFICIENT PROFILES

ED. EASTHAM
SEPT 16, 1952

CONFIDENTIAL INFORMATION

UNIVERSITY OF WICHITA
O.N.R. RM-4
F3D-3 SWEPT WING
$R_e = 2.69 \times 10^6$
$\alpha = 16°$
$\delta_F = 45°$



CONFIDENTIAL INFORMATION

FIGURE 13D - SPANWISE VARIATION OF NORMAL FORCE COEFFICIENT PROFILES

ED. EASTHAM
SEPT 18, 1952

CONFIDENTIAL

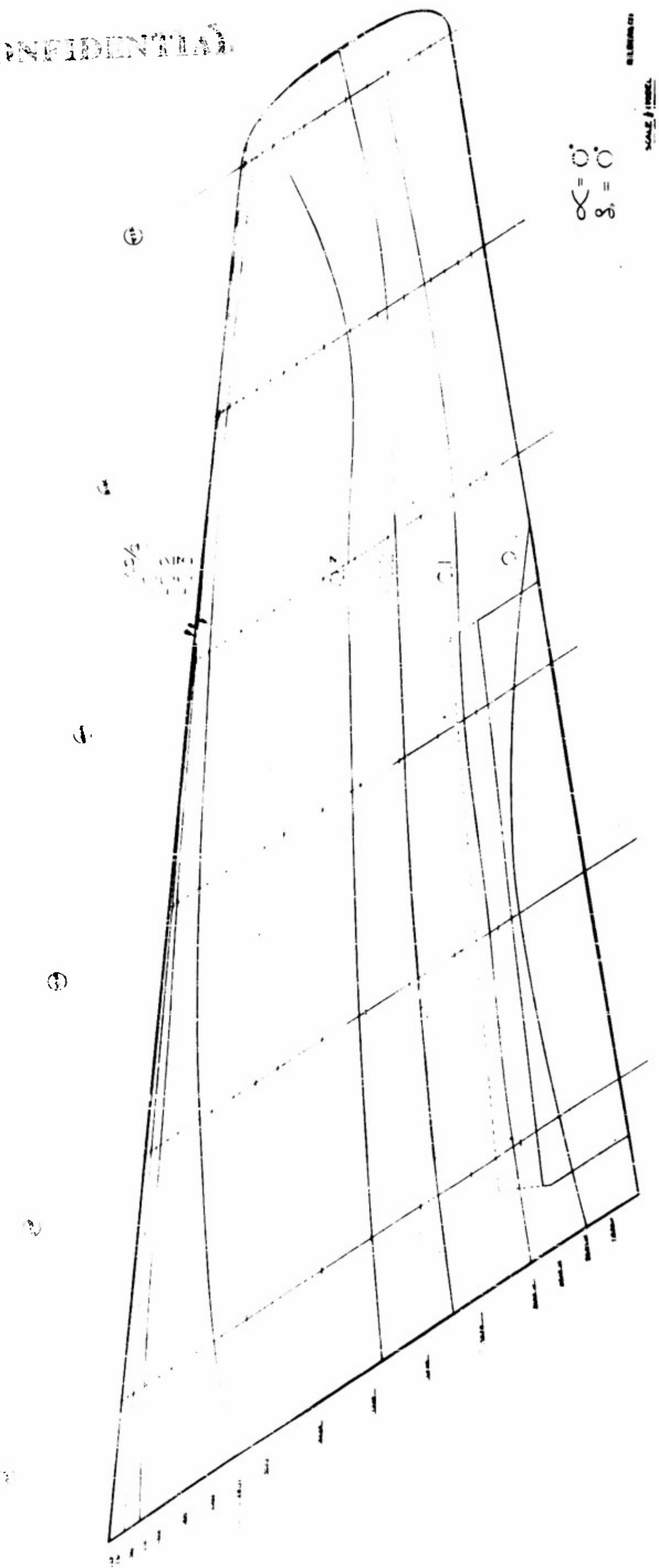


Figure 14.- Isobars on the wing upper surface with $\delta_F=0°$, $\alpha_t=0°$.

CONFIDENTIAL

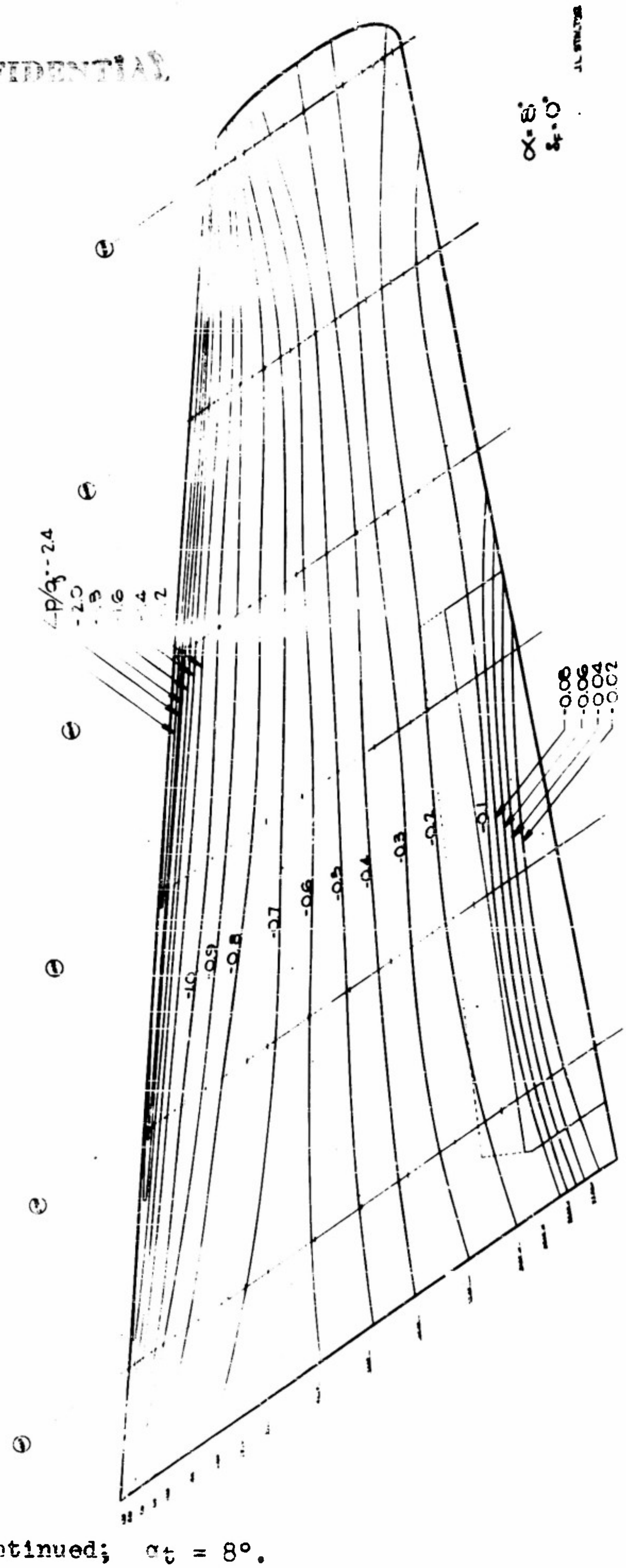


Figure 14.- Continued; $\alpha_t = 8°$.

CONFIDENTIAL

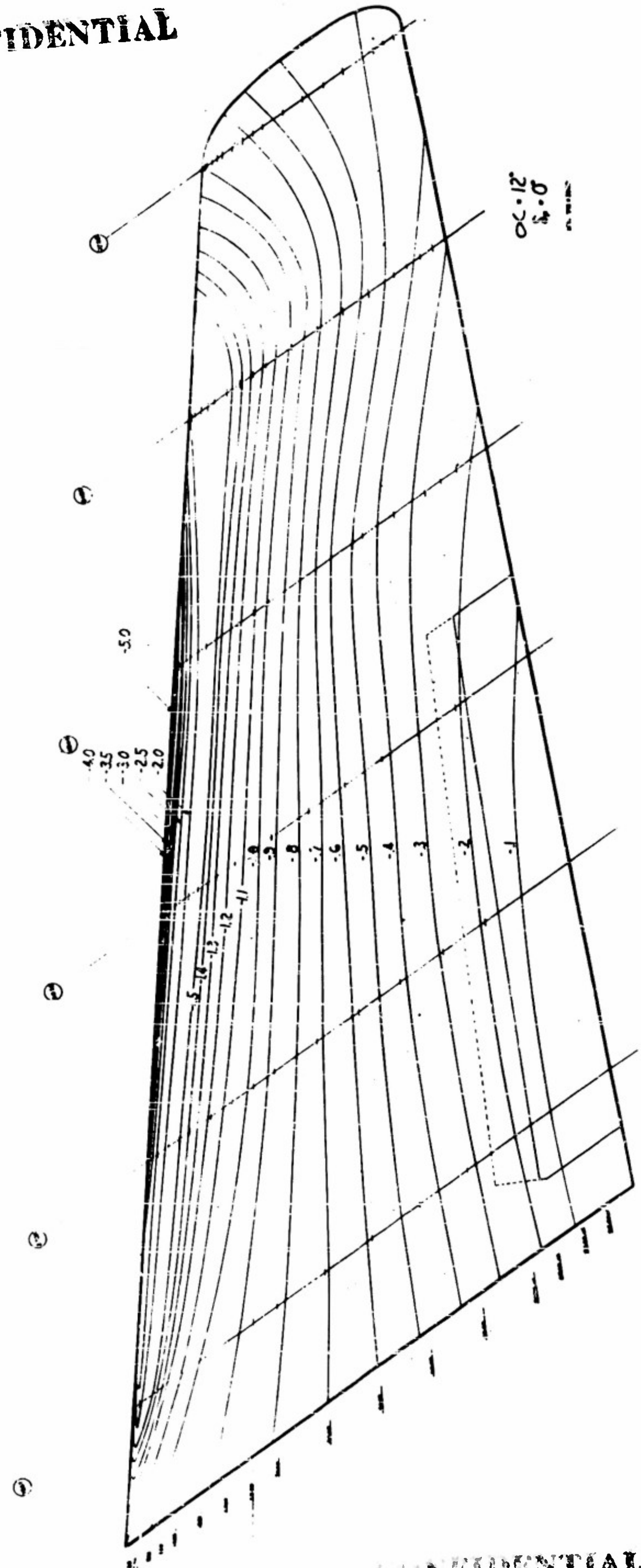


Figure 14.- Continued; $\alpha_t = 12°$.

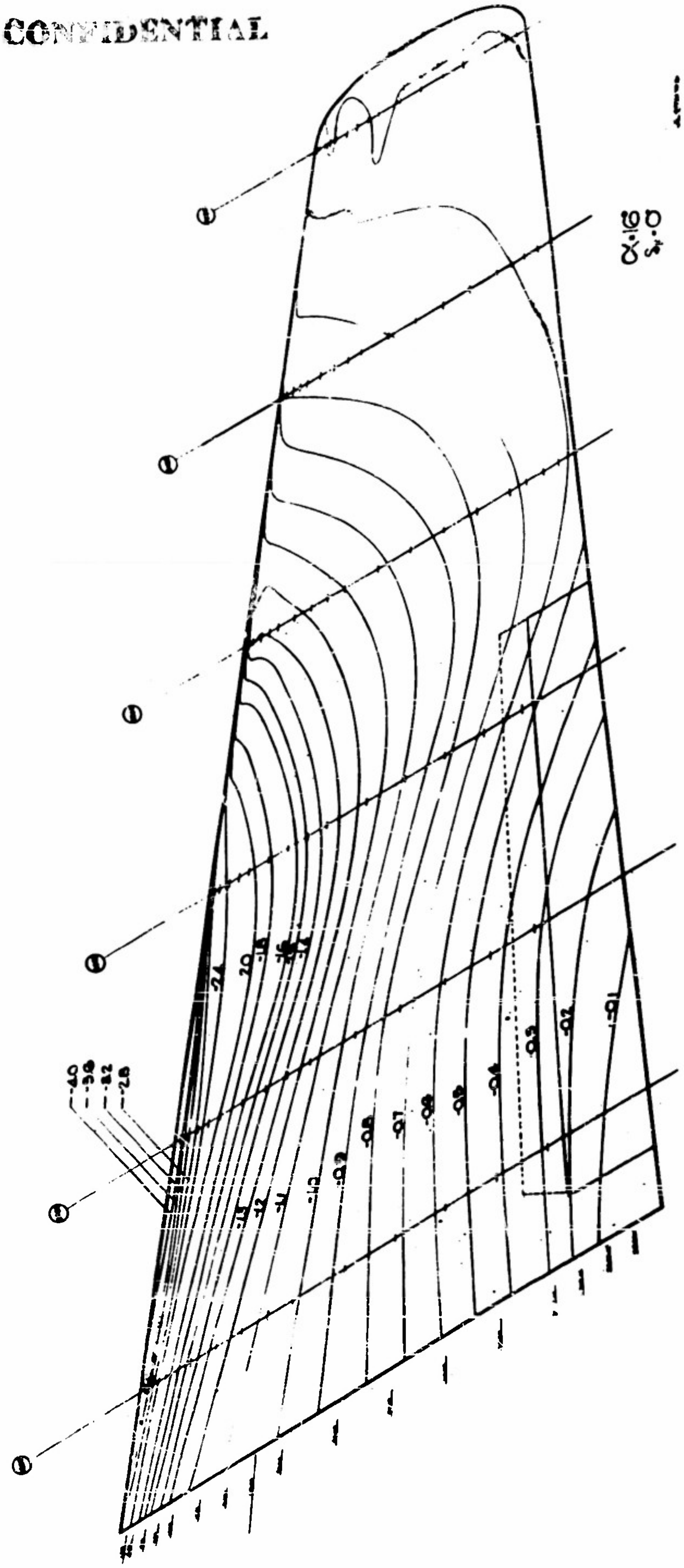


Figure 14.- Continued; $\alpha_t = 16°$.

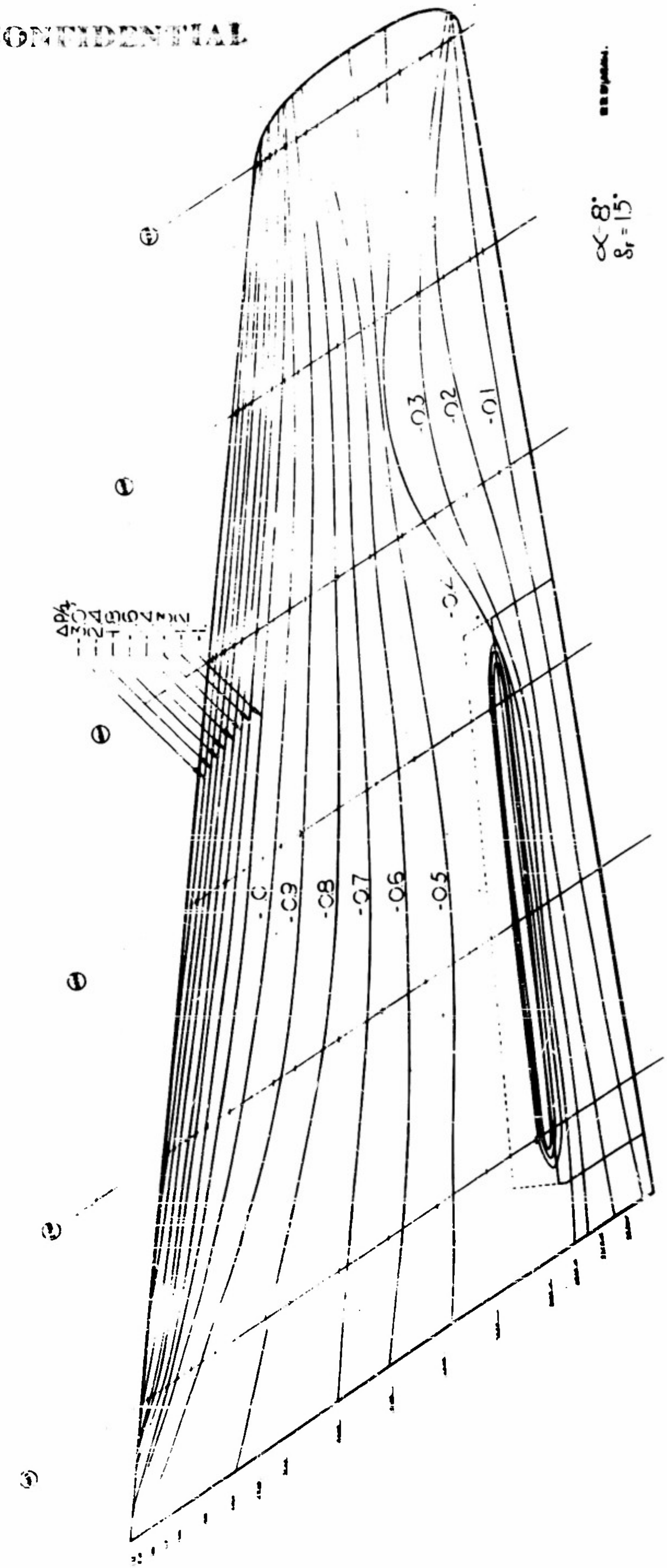


Figure 15.- Isobars on the wing upper surface with $\delta_F=15°$, $\alpha_t=8°$.

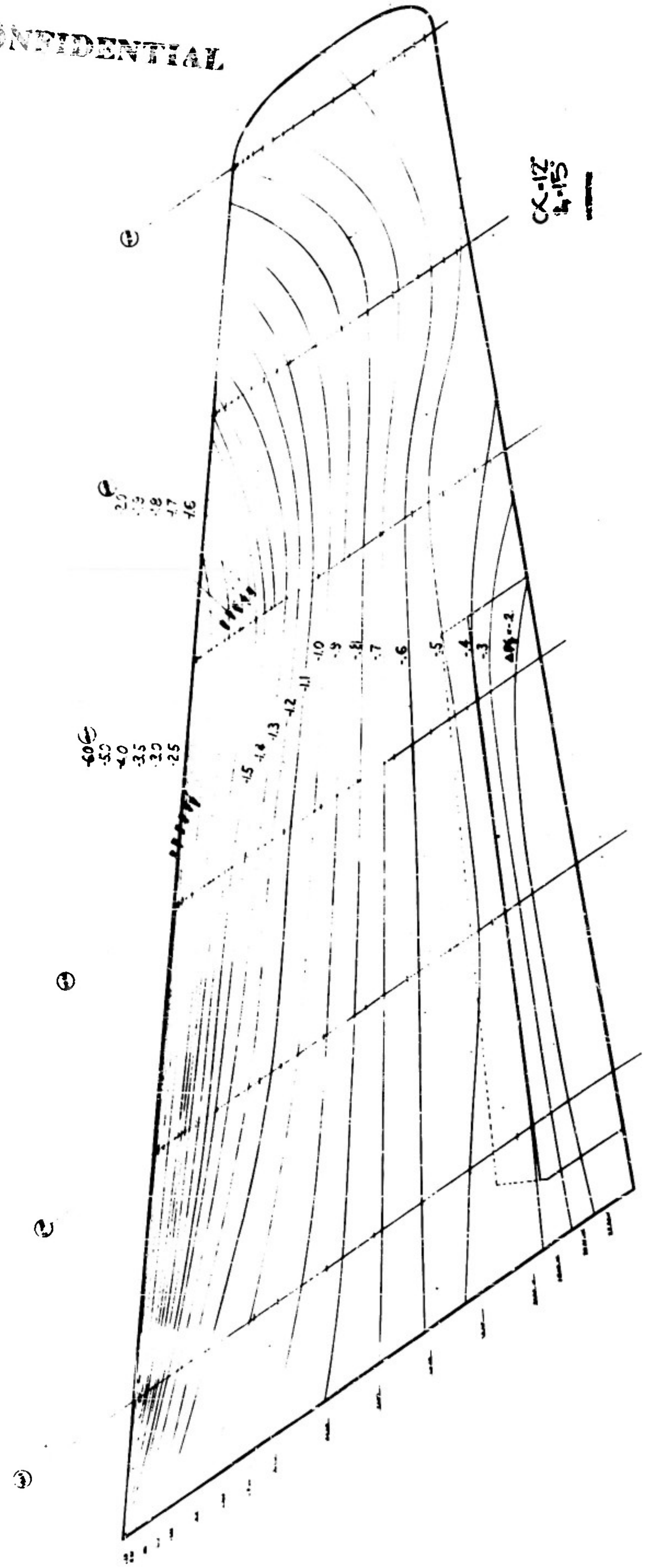


Figure 15.- Isobars on the wing upper surface with δ_F=15°, α_t=[illegible]°.

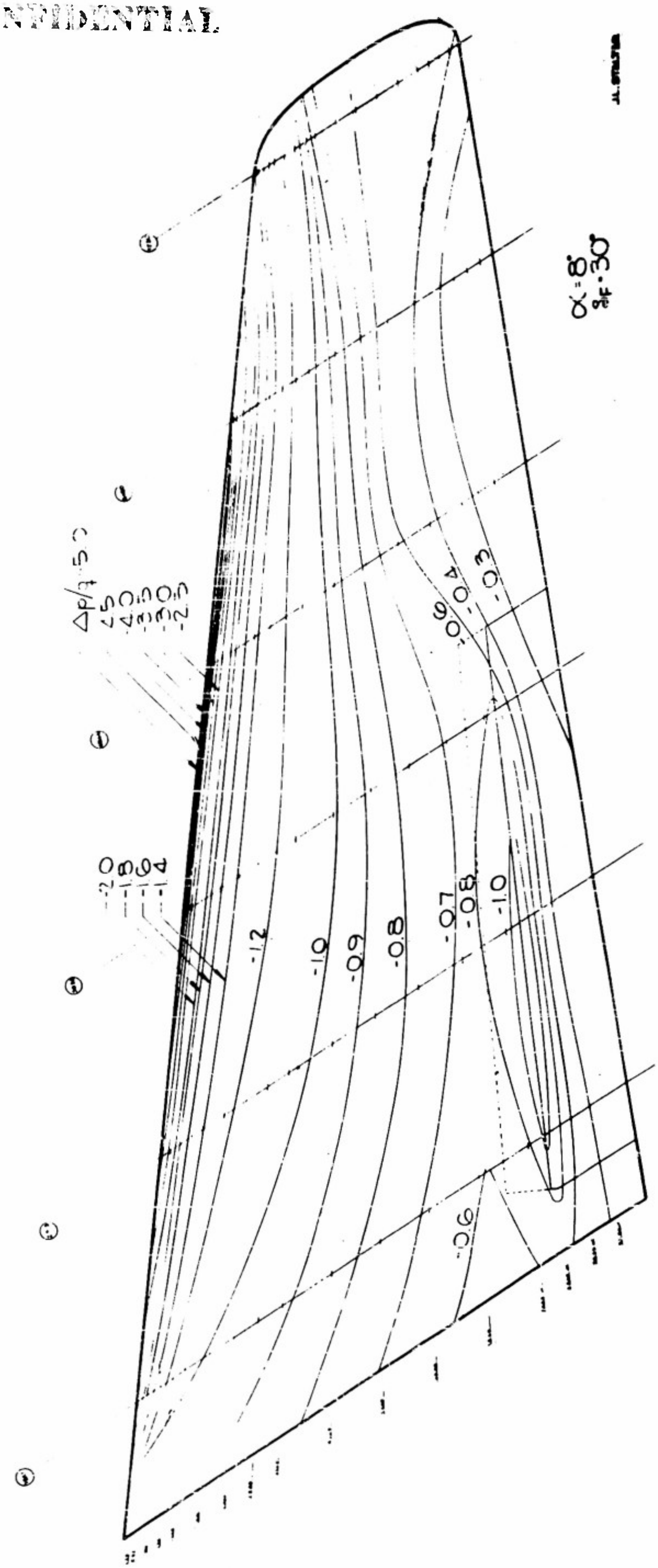


Figure 16.- Isobars on the wing upper surface with $\delta_F=30°$, $\alpha_t=8°$.

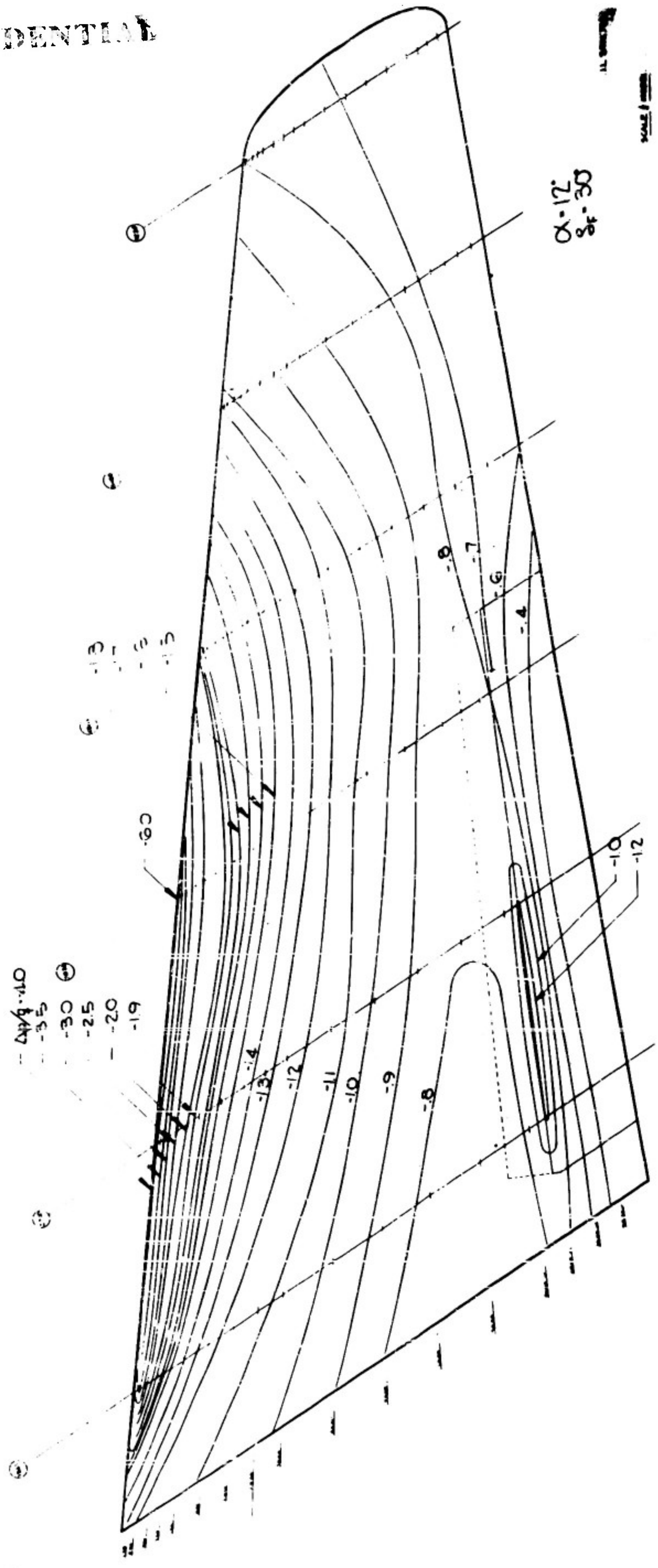


Figure 16.- Continued; $\alpha_t = 12°$.

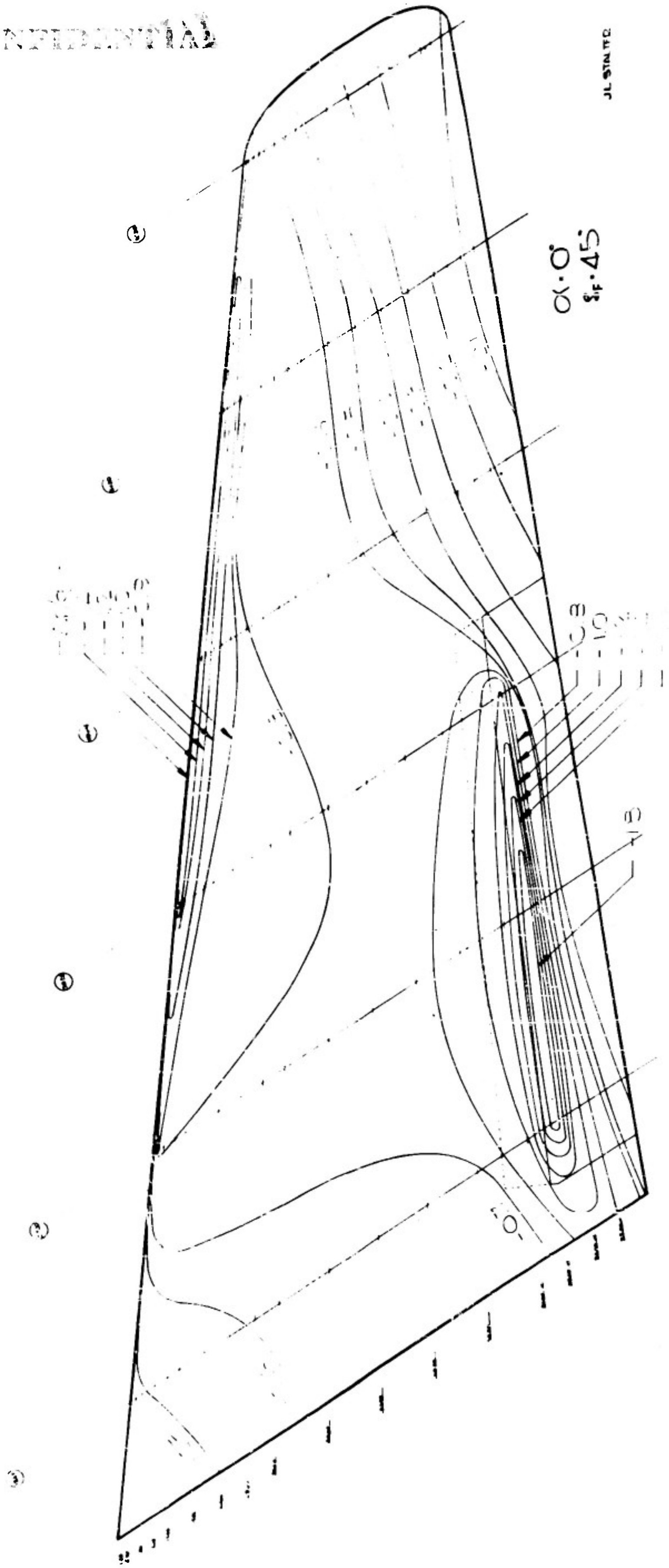


Figure 17.- Isobars on the wing upper surface with δ_F=45°, α_t=0°.

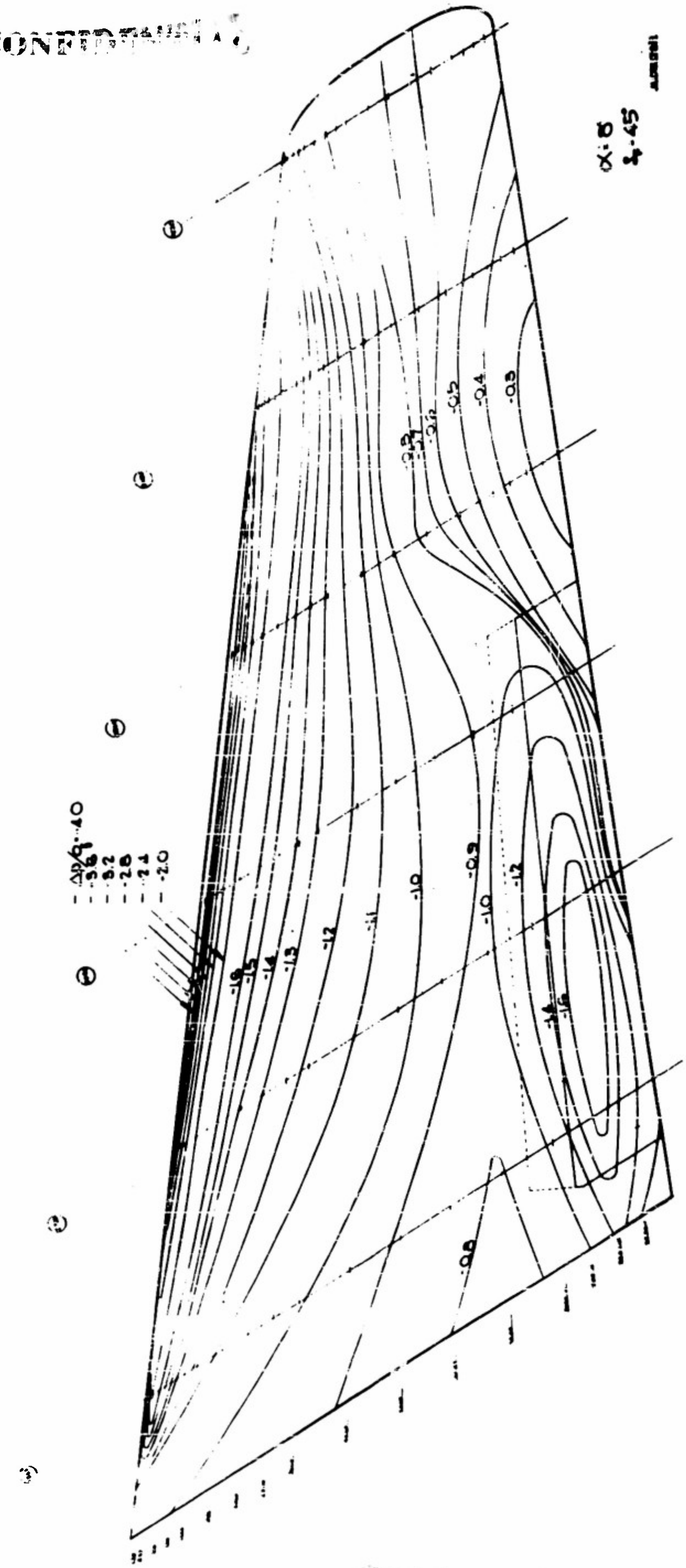


Figure 17.- Continued; $\alpha_t = 8°$.

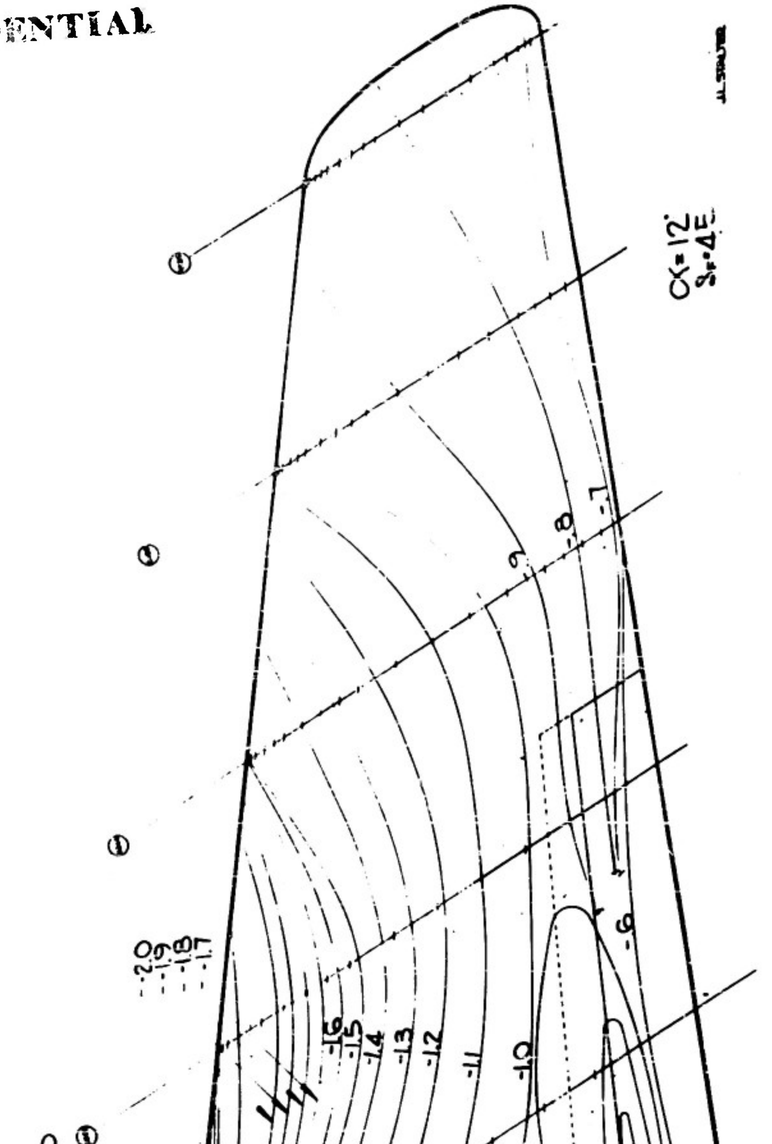


Figure 17.- Continued; $\alpha_t = 12°$.

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-0.19	0.07	0.18	-0.54	-0.62	0.17
1.25	-0.35	0.38	0.35	0.42	0.45	
2.5	-0.22	0.25	0.25	0.31	0.33	0.25
5.0	-0.08	0.12	0.11	0.14	0.16	0.12
7.5	-0.04	0.06	0.05	0.08	0.10	0.04
10.0	0.02	0.00	0.00	0.06	0.05	-0.03
15.0	0.08	-0.07	-0.06	-0.03	-0.03	-0.08
20.0	0.13	-0.12	-0.12	-0.08	-0.07	-0.13
25.0	0.17	-0.17	-0.15	-0.13	-0.12	-0.15
30.0	0.19	-0.18	-0.17	-0.15	-0.16	-0.14
40.0	0.21	-0.19	-0.17	-0.19	-0.18	-0.18
50.0	0.18	-0.18	-0.17	-0.16	-0.17	-0.17
60.0	0.14	-0.13	-0.13	-0.13	-0.13	-0.14
70.0	0.08	-0.08	-0.08	-0.09	-0.08	-0.10
80.0	0.04	-0.04	-0.04	-0.05	-0.05	-0.05
80.0f	-0.15	-0.12	-0.13			
85.0	0.02	0.03	0.00			
90.0	0.05	0.06	0.03	-0.03	0.00	-0.04

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-0.19	0.07	0.18	-0.54	-0.62	0.17
1.25	-0.60	-0.89	-0.96	-1.13	-1.22	
2.5	-0.58	-0.78	-0.84	-0.98	-1.09	-1.00
5.0	-0.52	-0.67	-0.67	-0.70	-0.69	-0.69
7.5	-0.48	-0.62	-0.63	-0.67	-0.77	-0.59
10.0	-0.49	-0.58	-0.63	-0.65	-0.68	-0.54
15.0	-0.50	-0.58	-0.60	-0.61	-0.62	-0.48
20.0	-0.48	-0.57	-0.57	-0.57	-0.55	-0.43
25.0	-0.49	-0.53	-0.54	-0.55	-0.51	-0.40
30.0	-0.48	-0.51	-0.50	-0.51	-0.50	-0.38
40.0	-0.44	-0.47	-0.45	-0.44	-0.42	-0.31
50.0	-0.38	-0.37	-0.35	-0.36	-0.35	-0.24
60.0	-0.29	-0.28	-0.28	-0.25	-0.26	-0.18
70.0	-0.19	-0.18	-0.17	-0.16	-0.17	-0.12
80.0	-0.08	-0.07	-0.08	-0.05	-0.06	-0.06
90.0	-0.02	0.00	0.01	0.04	0.02	-0.03

Figure 18.- Pressure Coefficient values with
Angle of Attack = -4°
Flap Deflection = 0°
and $R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

CONFIDENTIAL INFORMATION

UPPER SURFACE

percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	0.50	0.46	0.48	0.47	0.49	0.42
1.25	-0.01	-0.08	-0.15	-0.22	-0.22	
2.5	-0.12	-0.17	-0.20	-0.25	-0.28	-0.29
5.0	-0.21	-0.24	-0.29	-0.33	-0.34	-0.29
7.5	-0.22	-0.25	-0.28	-0.33	-0.32	-0.29
10.0	-0.26	-0.29	-0.30	-0.30	-0.30	-0.32
15.0	-0.28	-0.31	-0.31	-0.32	-0.33	-0.31
20.0	-0.31	-0.34	-0.34	-0.34	-0.33	-0.30
25.0	-0.32	-0.36	-0.36	-0.36	-0.35	-0.29
30.0	-0.34	-0.35	-0.35	-0.36	-0.37	-0.24
40.0	-0.33	-0.34	-0.35	-0.35	-0.34	-0.26
50.0	-0.30	-0.29	-0.29	-0.29	-0.29	-0.21
60.0	-0.23	-0.22	-0.21	-0.21	-0.23	-0.15
70.0	-0.15	-0.13	-0.13	-0.16	-0.15	-0.08
80.0	-0.09	-0.09	-0.08	-0.10	-0.08	-0.04
80.0f	-0.11	-0.03	-0.07			
85.0	-0.03	0.00	-0.03			
90.0	0.02	0.03	0.00	-0.06	-0.03	-0.03

LOWER SURFACE

percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	0.50	0.48	0.48	0.47	0.49	0.42
1.25	-0.05	-0.10	-0.11	-0.05	-0.03	
2.5	-0.13	-0.16	-0.17	-0.11	-0.08	-0.10
5.0	-0.19	-0.21	-0.21	-0.16	-0.14	-0.19
7.5	-0.20	-0.24	-0.25	-0.21	-0.23	-0.22
10.0	-0.24	-0.29	-0.29	-0.24	-0.25	-0.24
15.0	-0.29	-0.33	-0.33	-0.29	-0.28	-0.25
20.0	-0.29	-0.35	-0.34	-0.30	-0.28	-0.26
25.0	-0.31	-0.35	-0.34	-0.32	-0.28	-0.27
30.0	-0.32	-0.34	-0.33	-0.31	-0.29	-0.27
40.0	-0.32	-0.34	-0.32	-0.29	-0.28	-0.25
50.0	-0.29	-0.29	-0.26	-0.25	-0.26	-0.21
60.0	-0.22	-0.21	-0.19	-0.17	-0.19	-0.17
70.0	-0.14	-0.13	-0.12	-0.10	-0.12	-0.08
80.0	-0.05	-0.03	-0.03	-0.02	-0.03	-0.03
90.0	0.00	0.02	0.03	0.08	0.05	0.00

Figure 18 (Cont'd).- Pressure coefficient values with Angle of Attack = 0°, Flap Deflection = 0° and $R_e = 2.70 \times 10^6$

CONFIDENTIAL INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	0.34	-0.08	-0.11	-0.85	-0.33	-0.77
1.25	-0.56	-0.85	-0.99	-1.22	-1.40	
2.5	-0.56	-0.78	-0.86	-1.00	-1.11	-1.17
5.0	-0.56	-0.72	-0.76	-0.86	-0.96	-0.79
7.5	-0.52	-0.64	-0.68	-0.75	-0.79	-0.68
10.0	-0.52	-0.63	-0.64	-0.65	-0.71	-0.64
15.0	-0.51	-0.58	-0.58	-0.58	-0.64	-0.54
20.0	-0.51	-0.58	-0.57	-0.58	-0.59	-0.48
25.0	-0.52	-0.56	-0.55	-0.56	-0.58	-0.45
30.0	-0.52	-0.53	-0.52	-0.53	-0.57	-0.36
40.0	-0.47	-0.47	-0.48	-0.49	-0.49	-0.36
50.0	-0.41	-0.40	-0.39	-0.37	-0.40	-0.27
60.0	-0.32	-0.30	-0.29	-0.30	-0.30	-0.22
70.0	-0.22	-0.20	-0.19	-0.20	-0.21	-0.15
80.0	-0.14	-0.13	-0.12	-0.14	-0.13	-0.11
80.0	-0.06	-0.03	-0.03			
85.0	-0.07	-0.05	-0.07			
90.0	-0.02	0.00	-0.03	-0.08	-0.06	-0.09

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	0.34	-0.08	-0.11	-0.85	-0.33	-0.77
1.25	0.29	-0.36	0.35	0.41	0.46	
2.5	0.20	-0.25	0.23	0.31	0.38	0.36
5.0	0.10	-0.14	0.11	0.19	0.23	0.15
7.5	0.04	0.05	0.03	0.10	0.12	0.07
10.0	-0.02	0.09	-0.03	0.03	0.07	0.01
15.0	-0.09	-0.09	-0.10	-0.05	0.01	-0.07
20.0	-0.14	-0.14	-0.14	-0.09	-0.05	-0.12
25.0	-0.17	-0.15	-0.17	-0.14	-0.09	-0.15
30.0	-0.19	-0.17	-0.17	-0.15	-0.12	-0.19
40.0	-0.20	-0.25	-0.19	-0.16	-0.14	-0.20
50.0	-0.20	-0.17	-0.16	-0.14	-0.03	-0.19
60.0	-0.14	-0.14	-0.13	-0.10	-0.12	-0.16
70.0	-0.09	-0.08	-0.07	-0.05	-0.07	-0.12
80.0	-0.01	0.00	0.00	0.02	0.00	-0.04
90.0	0.03	0.03	0.05	0.10	0.05	-0.02

Figure 18 (cont'd.).- Pressure Coefficient values with
Angle of Attack = 4°
Flap Deflection = 0°
and $R_c = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

percent chord	Sta. 0.093	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-0.59	-1.62	-2.32	-2.50	-3.30	-3.32
1.25	-1.58	-2.04	-2.59	-3.36	-4.02	
2.5	-1.25	-1.63	-1.83	-2.05	-2.45	-2.29
5.0	-1.05	-1.25	-1.49	-1.67	-1.81	-1.61
7.5	-0.90	-1.03	-1.25	-1.37	-1.45	-1.04
10.0	-0.84	-0.99	-1.12	-1.17	-1.24	-1.07
15.0	-0.77	-0.86	-0.95	-0.99	-1.05	-0.86
20.0	-0.73	-0.79	-0.89	-0.91	-0.91	-0.73
25.0	-0.70	-0.76	-0.82	-0.85	-0.85	-0.65
30.0	-0.60	-0.73	-0.74	-0.78	-0.79	-0.50
40.0	-0.59	-0.60	-0.64	-0.66	-0.65	-0.50
50.0	-0.50	-0.49	-0.50	-0.51	-0.51	-0.40
60.0	-0.38	-0.36	-0.37	-0.38	-0.38	-0.35
70.0	-0.26	-0.24	-0.25	-0.27	-0.27	-0.28
80.0	-0.17	-0.15	-0.15	-0.17	-0.17	-0.25
80.0f	-0.02	0.00	0.02			
85.0	-0.10	-0.08	-0.10			
90.0	-0.04	-0.03	-0.06	-0.10	-0.10	-0.21

LOWER SURFACE

percent chord	Sta. 0.093	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-0.59	-1.62	-2.32	-2.50	-3.30	-3.32
1.25	0.50	0.45	0.47	0.44	0.37	
2.5	0.45	0.43	0.47	0.50	0.50	0.45
5.0	0.36	0.35	0.39	0.44	0.46	0.36
7.5	0.29	0.27	0.30	0.37	0.37	0.26
10.0	0.21	0.21	0.25	0.30	0.31	0.19
15.0	0.12	0.11	0.14	0.20	0.22	0.08
20.0	0.05	0.05	0.08	0.13	0.15	0.01
25.0	0.01	0.01	0.03	0.07	0.10	-0.05
30.0	-0.03	-0.03	0.01	0.03	0.04	-0.10
40.0	-0.07	-0.07	-0.04	-0.02	- 0.01	-0.16
50.0	-0.08	-0.07	-0.04	-0.03	- 0.01	-0.16
60.0	-0.06	-0.06	-0.04	-0.02	- 0.04	-0.03
70.0	-0.03	-0.03	0.00	0.00	- 0.03	-0.13
80.0	0.03	0.03	0.04	0.04	0.03	-0.08
90.0	0.05	0.05	0.07	0.10	0.05	-0.06

Figure 18 (Cont'd).- Pressure coefficient values with
Angle of Attack = 8°,
Flap Deflection = 0°
and $R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-1.48	-3.81	-5.51	-5.86	-2.14	-0.95
1.25	-2.38	-2.89	-3.86	-4.90	-1.88	
2.5	-1.69	-2.32	-2.94	-3.43	-1.86	-0.84
5.0	-1.39	-1.84	-2.20	-2.50	-1.87	-0.84
7.5	-1.18	-1.51	1.81	-2.03	-1.79	-0.76
10.0	-1.10	-1.38	-1.56	-1.71	-1.72	-0.85
15.0	-0.97	-1.17	-1.29	-1.40	-1.56	-0.84
20.0	-0.92	-1.06	-1.15	-1.24	-1.42	-0.82
25.0	-0.87	-0.97	-1.04	-1.11	-1.29	-0.79
30.0	-0.82	-0.87	-0.92	-0.99	-1.18	-0.64
40.0	-0.71	-0.72	-0.76	-0.80	-0.98	-0.67
50.0	-0.59	-0.58	-0.58	-0.61	-0.82	-0.61
60.0	-0.45	-0.42	-0.43	-0.45	-0.69	-0.57
70.0	-0.32	-0.29	-0.30	-0.35	-0.56	-0.53
80.0	-0.20	-0.19	-0.21	-0.27	-0.47	-0.50
80.0f	0.03	-0.05	0.05			
85.0	-0.13	-0.13	-0.18			
90.0	-0.07	-0.08	-0.14	-0.22	-0.38	-0.40

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-1.48	-3.81	-5.51	-5.86	-2.14	-0.95
1.25	-0.50	0.32	0.15	0.02	0.33	
2.5	0.52	0.48	0.42	0.36	0.50	0.44
5.0	0.45	0.48	0.49	0.51	0.53	0.35
7.5	0.40	0.44	0.45	0.49	0.46	0.28
10.0	0.34	0.39	0.40	0.45	0.41	0.21
15.0	0.24	0.29	0.31	0.36	0.32	0.12
20.0	0.18	0.20	0.24	0.28	0.25	0.04
25.0	0.13	0.15	0.19	0.22	0.19	-0.03
30.0	0.08	0.12	0.14	0.17	0.13	-0.08
40.0	0.03	0.04	0.07	0.08	0.05	-0.14
50.0	0.00	0.03	0.04	0.04	0.00	-0.17
60.0	0.02	0.02	0.03	0.03	-0.03	-0.03
70.0	0.03	0.03	0.04	0.03	-0.04	-0.18
80.0	0.08	0.07	0.07	0.05	-0.03	-0.15
90.0	0.08	0.07	0.07	0.08	-0.03	-0.15

Figure 18 (cont'd).- Pressure Coefficient values with
Angle of Attack = 12^{o}
Flap Deflection = 0^{o}
and R_e = 2.70×10^{6}

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-3.13	-6.60	-3.13	-1.56	-0.90	-0.57
1.25	-3.92	-4.35	-2.67	-1.27	-0.77	
2.5	-2.51	-3.37	-2.66	-1.29	-0.78	-0.53
5.0	-1.95	-2.64	-2.38	-1.31	-0.79	-0.53
7.5	-1.61	-2.17	-2.22	-1.28	-0.78	-0.47
10.0	-1.45	-1.99	-2.07	-1.26	-0.77	-0.53
15.0	-1.25	-1.62	-1.83	-1.22	-0.75	-0.53
20.0	-1.15	-1.42	-1.64	-1.18	-0.74	-0.53
25.0	-1.07	-1.29	-1.48	-1.13	-0.73	-0.52
30.0	-1.02	-1.14	-1.36	-1.10	-0.72	-0.44
40.0	-0.87	-0.94	-1.16	-1.02	-0.70	-0.51
50.0	-0.73	-0.75	-0.99	-0.95	-0.68	-0.51
60.0	-0.57	-0.58	-0.83	-0.88	-0.67	-0.51
70.0	-0.42	-0.44	-0.68	-0.79	-0.65	-0.51
80.0	-0.28	-0.32	-0.54	-0.72	-0.62	-0.51
80.0f	0.08	0.08	-0.03			
85.0	-0.19	-0.26	-0.49			
90.0	-0.12	-0.22	-0.45	-0.65	-0.58	-0.5[illegible]

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-3.13	-6.60	-3.13	-1.56	-0.90	-0.57
1.25	0.36	-0.07	0.14	0.33	0.39	
2.5	0.53	0.38	0.45	0.49	0.50	0.42
5.0	0.57	0.55	0.56	0.54	0.49	0.33
7.5	0.54	0.54	0.53	0.51	0.44	0.26
10.0	0.48	0.55	0.49	0.47	0.39	0.23
15.0	0.40	0.43	0.41	0.37	0.30	0.11
20.0	0.33	0.35	0.33	0.30	0.24	0.03
25.0	0.27	0.29	0.26	0.22	0.17	-0.04
30.0	0.22	0.24	0.21	0.18	0.11	-0.09
40.0	0.16	0.15	0.12	0.08	0.03	-0.17
50.0	0.10	0.11	0.08	0.03	0.00	-0.20
60.0	0.10	0.08	0.03	-0.01	-0.09	-0.08
70.0	0.10	0.07	0.03	-0.04	-0.13	-0.23
80.0	0.12	0.10	0.03	-0.05	-0.13	-0.21
90.0	0.11	0.06	0.00	-0.07	-0.16	-0.22

Figure 18 (cont'd.).- Pressure Coefficient values with
Angle of Attack = 16°
Flap Deflection = 0°
and $R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

BEST COPY AVAILABLE

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-4.88	-2.36	-1.69	-1.10	-0.75	-0.56
1.25	-3.89	-2.10	-1.33	-0.85	-0.60	
2.5	-3.33	-2.10	-1.34	-0.85	-0.61	-0.56
5.0	-2.38	-2.05	-1.34	-0.85	-0.61	-0.56
7.5	-1.96	-2.00	-1.32	-0.84	-0.61	-0.55
10.0	-1.77	-1.94	-1.29	-0.84	-0.61	-0.55
15.0	-1.52	-1.86	-1.25	-0.81	-0.61	-0.55
20.0	-1.39	-1.77	-1.23	-0.80	-0.61	-0.55
25.0	-1.30	-1.67	-1.20	-0.80	-0.61	-0.55
30.0	-1.25	-1.57	-1.19	-0.80	-0.60	-0.48
40.0	-1.11	-1.40	-1.33	-0.80	-0.60	-0.55
50.0	-0.99	-1.25	-1.12	-0.80	-0.60	-0.56
60.0	-0.84	-1.09	-1.05	-0.80	-0.61	-0.57
70.0	-0.66	-0.94	-0.99	-0.79	-0.61	-0.57
80.0	-0.49	-0.78	-0.91	-0.75	-0.60	-0.57
80.0f	0.10	0.04	-0.03			
85.0	-0.38	-0.69	-0.87			
90.0	-0.28	-0.62	-0.82	-0.71	-0.58	-0.56

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-4.88	-2.36	-1.69	-1.10	-0.75	-0.55
1.25	0.16	0.16	0.27	0.37	0.39	
2.5	0.51	0.48	0.50	0.50	0.50	0.40
5.0	0.64	0.62	0.57	0.55	0.52	0.36
7.5	0.64	0.61	0.55	0.53	0.47	0.30
10.0	0.61	0.58	0.52	0.48	0.43	0.24
15.0	0.53	0.50	0.43	0.40	0.34	0.15
20.0	0.45	0.43	0.37	0.32	0.27	0.07
25.0	0.38	0.36	0.29	0.25	0.21	0.00
30.0	0.33	0.30	0.24	0.19	0.14	-0.06
40.0	0.23	0.20	0.13	0.09	0.05	-0.15
50.0	0.17	0.13	0.08	0.02	0.00	-0.19
60.0	0.14	0.08	0.01	-0.25	-0.08	-0.23
70.0	0.13	0.06	-0.03	-0.07	-0.13	-0.23
80.0	0.13	0.05	-0.07	-0.10	-0.13	-0.23
90.0	0.10	-0.03	-0.15	-0.12	-0.18	-0.23

Figure 18 (cont'd).- Pressure Coefficient values with
Angle of Attack = 20°
Flap Deflection = 0°
and $R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-4.42	-1.71	-1.29	-0.99	-0.74	-0.58
1.25	-3.41	-1.64	-1.19	-0.79	-0.64	
2.5	-3.05	-1.64	-1.19	-0.79	-0.65	-0.59
5.0	-2.64	-1.60	-1.19	-0.79	-0.65	-0.59
7.5	-2.37	-1.55	-1.16	-0.79	-0.65	-0.57
10.0	-2.15	-1.55	-1.14	-0.78	-0.65	-0.59
15.0	-1.83	-1.50	-1.11	-0.77	-0.65	-0.59
20.0	-1.66	-1.47	-1.09	-0.77	-0.65	-0.59
25.0	-1.51	-1.45	-1.07	-0.75	-0.65	-0.59
30.0	-1.45	-1.41	-1.06	-0.76	-0.65	-0.50
40.0	-1.29	-1.36	-1.07	-0.77	-0.65	-0.61
50.0	-1.19	-1.29	-1.05	-0.78	-0.65	-0.61
60.0	-1.08	-1.21	-1.03	-0.79	-0.65	-0.61
70.0	-0.94	-1.03	-0.98	-0.79	-0.65	-0.61
80.0	-0.79	-1.03	-0.93	-0.77	-0.64	-0.58
80.0f	0.08	-0.02	0.04	-0.75	-0.64	-0.59
85.0	-0.69	-0.97	-0.89			
90.0	-0.59	-0.91	-0.85	-0.74	-0.63	-0.59

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-4.42	-1.71	-1.29	-0.99	-0.74	-0.58
1.25	0.13	0.12	0.19	0.28	0.28	
2.5	0.52	0.45	0.46	0.47	0.44	0.36
5.0	0.70	0.61	0.58	0.57	0.53	0.36
7.5	0.71	0.62	0.58	0.56	0.50	0.34
11.0	0.68	0.62	0.56	0.53	0.48	0.29
15.0	0.61	0.54	0.48	0.46	0.41	0.20
20.0	0.53	0.47	0.41	0.39	0.35	0.12
25.0	0.45	0.41	0.35	0.32	0.29	0.05
30.0	0.40	0.35	0.29	0.27	0.22	-0.02
40.0	0.29	0.24	0.18	0.15	0.12	-0.12
50.0	0.22	0.17	0.11	0.07	0.00	-0.17
60.0	0.17	0.08	0.03	0.02	-0.04	-0.07
70.0	0.13	0.03	-0.03	-0.04	-0.09	-0.24
80.0	0.12	0.00	-0.08	-0.08	-0.12	-0.24
90.0	0.03	-0.14	-0.17	-0.11	-0.17	-0.25

Figure 18 (cont'd.).- Pressure Coefficient values with
Angle of Attack = 24°
Flap Deflection = 6°
and $R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

CONFIDENTIAL INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-2.42	-1.37	-1.09	-0.89	-0.74	-0.58
1.25	-1.84	-1.36	-1.09	-0.82	-0.71	
2.5	-1.79	-1.36	-1.09	-0.82	-0.71	-0.60
5.0	-1.70	-1.35	-1.07	-0.82	-0.71	-0.60
7.5	-1.66	-1.32	-1.05	-0.82	-0.71	-0.58
10.0	-1.63	-1.31	-1.04	-0.81	-0.71	-0.60
15.0	-1.55	-1.29	-1.02	-0.80	-0.70	-0.60
20.0	-1.50	-1.27	-1.00	-0.80	-0.70	-0.60
25.0	-1.44	-1.25	-0.99	-0.79	-0.70	-0.60
30.0	-1.39	-1.24	-0.99	-0.80	-0.70	-0.52
40.0	-1.31	-1.22	-0.99	-0.79	-0.70	-0.61
50.0	-1.25	-1.20	-0.99	-0.79	-0.69	-0.62
60.0	-1.20	-1.17	-0.99	-0.79	-0.69	-0.62
70.0	-1.13	-1.12	-0.96	-0.78	-0.68	-0.61
80.0	-1.05	-1.07	-0.92	-0.77	-0.67	-0.61
80.0f	0.07	0.00	-0.03			
85.0	-0.99	-1.03	-0.89			
90.0	-0.94	-0.99	-0.86	-0.74	-0.64	-0.60

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-2.42	-1.37	-1.09	-0.89	-0.74	-0.58
1.25	0.24	0.09	0.13	0.18	0.18	
2.5	0.56	0.43	0.43	0.42	0.40	0.30
5.0	0.74	0.63	0.58	0.58	0.54	0.38
7.5	0.76	0.66	0.61	0.59	0.55	0.37
10.0	0.74	0.65	0.60	0.58	0.53	0.33
15.0	0.67	0.60	0.54	0.53	0.48	0.25
20.0	0.60	0.53	0.48	0.46	0.42	0.17
25.0	0.53	0.47	0.41	0.39	0.35	0.10
30.0	0.47	0.42	0.35	0.33	0.28	0.03
40.0	0.36	0.29	0.23	0.22	0.18	-0.08
50.0	0.26	0.20	0.14	0.13	0.00	-0.14
60.0	0.19	0.11	0.05	0.06	0.00	-0.07
70.0	0.13	0.03	-0.01	0.00	-0.06	-0.22
80.0	0.08	-0.03	-0.07	-0.05	-0.09	-0.23
90.0	-0.06	-0.18	-0.18	-0.09	-0.16	-0.24

Figure 18 (cont'd.).- Pressure Coefficient values with
Angle of Attack = 28^{o}
Flap Deflection = 0^{o}
$R_c = 2.70 \times 10^6$

CONFIDENTIAL INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

percent chord	Sta. 0.095	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.737	Sta. 0.960
00.00	-1.86	-1.27	-1.07	-0.87	-0.74	-0.60
1.25	-1.58	-1.27	-1.07	-0.85	-0.73	[illegible]
2.5	-1.54	-1.27	-1.07	-0.85	-0.73	-0.61
5.0	-1.50	-1.27	-1.06	-0.84	-0.73	-0.60
7.5	-1.47	-1.24	-1.03	-0.83	-0.72	-0.59
10.0	-1.44	-1.25	-1.03	-0.83	-0.73	-0.59
15.0	-1.39	-1.21	-1.00	-0.82	-0.72	-0.60
20.0	-1.35	-1.20	-1.00	-0.82	-0.72	-0.61
25.0	-1.31	-1.20	-0.[illegible]	-0.81	-0.72	-0.61
30.0	-1.30	-1.1[illegible]	-0.[illegible]	-0.81	-0.72	-0.53
40.0	-1.24	-1.1[illegible]	-0.9[illegible]	-0.81	-0.71	-0.62
50.0	-1.21	-1.1[illegible]	[illegible]	-0.79	-0.71	-0.61
60.0	-1.19	-1.1[illegible]	-0.[illegible]7	-0.79	-0.70	-0.63
70.0	-1.14	-1.07	-0.[illegible]5	-0.79	-0.68	-0.52
80.0	-1.07	-1.07	-0.91	-0.79	-0.68	-0.61
80.0f	-0.07	-0.02	-0.02			
85.0	-1.04	-1.02	-0.90			
90.0	-1.01	-0.92	-0.87	-0.77	-0.66	-0.61

LOWER SURFACE

percent chord	Sta. 0.095	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.737	Sta. 0.960
00.00	-1.86	-1.27	-1.07	-0.87	-0.74	-0.60
1.25	0.25	0.05	0.07	0.14	0.14	
2.5	0.59	0.41	0.40	0.40	0.39	0.27
5.0	0.76	0.65	0.59	0.59	0.56	0.39
7.5	0.79	0.67	0.63	0.63	0.58	0.35
10.0	0.7[illegible]	0.68	0.63	0.61	0.57	0.33
15.0	0.71	0.63	0.53	0.56	0.52	0.26
20.0	0.64	0.57	0.52	0.50	0.46	0.18
25.0	0.57	0.51	0.46	0.44	0.40	0.11
30.0	0.50	0.45	0.40	0.37	0.34	0.04
40.0	0.39	0.35	0.28	0.25	0.22	-0.07
50.0	0.29	0.23	0.19	0.17	0.01	-0.13
60.0	0.21	0.13	0.03	0.08	0.04	-0.03
70.0	0.14	0.05	0.02	0.03	-0.03	-0.21
80.0	0.07	0.02	-0.04	-0.03	-0.07	-0.22
90.0	-0.05	-0.15	-0.13	-0.08	-0.14	-0.24

Figure 13 (Cont'd).- Pressure coefficient values with
Angle of Attack = 30°
Flap Deflection = 0°
and $R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	0.30	0.32	0.30	0.07	0.03	0.35
1.25	0.30	0.28	0.23	0.26	0.30	
2.5	0.17	0.14	0.12	0.14	0.17	0.11
5.0	0.03	0.00	-0.02	-0.02	0.01	0.00
7.5	-0.03	-0.05	-0.07	-0.07	-0.03	-0.06
10.0	-0.08	-0.12	-0.12	-0.09	-0.07	-0.12
15.0	-0.15	-0.19	-0.17	-0.15	-0.13	-0.15
20.0	-0.20	-0.24	-0.23	-0.20	-0.16	-0.19
25.0	-0.24	-0.29	-0.27	-0.24	-0.20	-0.20
30.0	-0.28	-0.29	-0.28	-0.27	-0.23	-0.19
40.0	-0.30	-0.33	-0.33	-0.29	-0.23	-0.22
50.0	-0.29	-0.32	-0.31	-0.25	-0.22	-0.19
60.0	-0.27	-0.30	-0.28	-0.21	-0.18	-0.15
70.0	-0.24	-0.27	-0.25	-0.15	-0.11	-0.08
80.0	-0.30	-0.35	-0.30	-0.10	-0.02	-0.04
80.0f	-0.63	-0.77	-0.52			
85.0	-0.29	-0.29	-0.22			
90.0	-0.19	-0.14	-0.17	-0.06	-0.02	-0.03

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	0.30	0.32	0.30	0.07	0.03	0.35
1.25	-0.49	-0.59	-0.60	-0.64	-0.74	
2.5	-0.47	-0.54	-0.55	-0.57	-0.62	-0.64
5.0	-0.44	-0.49	-0.47	-0.46	-0.48	-0.51
7.5	-0.40	-0.47	-0.45	-0.46	-0.53	-0.45
10.0	-0.42	-0.45	-0.45	-0.45	-0.50	-0.44
15.0	-0.42	-0.46	-0.45	-0.44	-0.47	-0.40
20.0	-0.40	-0.45	-0.42	-0.42	-0.43	-0.37
25.0	-0.40	-0.41	-0.39	-0.40	-0.40	-0.35
30.0	-0.39	-0.39	-0.34	-0.38	-0.40	-0.34
40.0	-0.35	-0.33	-0.29	-0.32	-0.34	-0.28
50.0	-0.28	-0.22	-0.19	-0.25	0.00	-0.22
60.0	-0.17	-0.12	-0.10	-0.17	-0.22	-0.03
70.0	-0.07	0.00	0.02	-0.10	-0.13	-0.10
80.0	0.30	0.34	0.27	-0.03	-0.04	-0.03
90.0	0.14	0.14	0.13	0.07	0.03	0.00

Figure 19. - Pressure Coefficient values with
Angle of Attack = -4°
Flap Deflection = 15°
$R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	0.48	0.37	0.33	0.38	0.40	0.33
1.25	-0.23	-0.34	-0.50	-0.64	-0.61	
2.5	-0.30	-0.39	-0.49	-0.56	-0.57	-0.44
5.0	-0.36	-0.44	-0.51	-0.58	-0.56	-0.40
7.5	-0.35	-0.42	-0.49	-0.54	-0.50	-0.33
10.0	-0.38	-0.45	-0.48	-0.48	-0.46	-0.40
15.0	-0.37	-0.46	-0.48	-0.47	-0.45	-0.37
20.0	-0.40	-0.49	-0.50	-0.49	-0.44	-0.35
25.0	-0.40	-0.50	-0.51	-0.50	-0.45	-0.34
30.0	-0.44	-0.49	-0.50	-0.49	-0.45	-0.28
40.0	-0.42	-0.49	-0.50	-0.47	-0.41	-0.29
50.0	-0.42	-0.45	-0.44	-0.38	-0.35	-0.22
60.0	-0.35	-0.39	-0.38	-0.30	-0.26	-0.17
70.0	-0.30	-0.34	-0.32	-0.23	-0.18	-0.10
80.0	-0.34	-0.41	-0.35	-0.15	-0.04	-0.05
80.0f	-0.71	-0.92	-0.54			
85.0	-0.32	-0.34	-0.23			
90.0	-0.19	-0.15	-0.17	-0.09	-0.04	-0.03

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	0.48	0.37	0.33	0.38	0.40	0.33
1.25	0.10	0.12	0.15	0.21	0.21	
2.5	0.03	0.03	0.04	0.12	0.13	0.03
5.0	-0.05	-0.05	-0.03	0.03	0.02	-0.10
7.5	-0.08	-0.10	-0.08	-0.05	-0.08	-0.13
10.0	-0.13	-0.13	-0.13	-0.09	-0.12	-0.18
15.0	-0.19	-0.19	-0.18	-0.15	-0.17	-0.21
20.0	-0.19	-0.22	-0.20	-0.17	-0.18	-0.22
25.0	-0.21	-0.22	-0.21	-0.20	-0.20	-0.24
30.0	-0.22	-0.21	-0.19	-0.20	-0.21	-0.25
40.0	-0.21	-0.19	-0.17	-0.19	-0.21	-0.24
50.0	-0.17	-0.13	-0.11	-0.17	0.00	-0.20
60.0	-0.09	-0.04	-0.03	-0.11	-0.16	-0.09
70.0	-0.02	0.05	0.07	-0.05	-0.09	-0.08
80.0	0.30	0.34	0.30	0.02	-0.01	-0.03
90.0	0.17	0.17	0.14	0.10	0.05	0.00

Figure 19.- Pressure Coefficient values with
Angle of Attack = 0°
Flap Deflection = 15°
and $R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

percent chord	Sta. 0.0[illegible]	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.737	Sta. 0.960
00.00	0.20	-0.43	-0.80	0.17	-1.15	-1.59
1.25	-0.74	-1.13	-1.55	-0.75	-2.12	
2.5	-0.71	-1.04	-1.32	-0.74	-1.39	-1.[illegible]4
5.0	-0.[illegible]	-0.91	-1.07	-0.89	-1.21	-0.99
7.5	-0.[illegible]2	-0.73	-0.[illegible]3	-0.[illegible]4	-0.94	-0.84
10.0	-0.82	-0.73	-0.87	-0.82	-0.83	-0.79
15.0	-0.[illegible]1	-0.72	-0.73	-0.79	-0.75	-0.65
20.0	-0.62	-0.71	-0.77	-0.77	-0.72	-0.58
25.0	-0.62	-0.70	-0.74	-0.74	-0.69	-0.55
30.0	-0.62	-0.67	-0.70	-0.69	-0.65	-0.42
40.0	-0.53	-0.63	-0.66	-0.64	-0.57	-0.42
50.0	-0.53	-0.56	-0.58	-0.50	-0.44	-0.33
60.0	-0.45	-0.46	-0.47	-0.40	-0.36	-0.28
70.0	-0.3[illegible]	-0.42	-0.39	-0.30	-0.23	-0.20
80.0	-0.40	-0.45	-0.43	-0.20	-0.11	-0.17
90.0f	-0.77	-0.92	-0.88			
95.0	-0.35	-0.35	-0.32			
90.0	-0.42	-0.17	-0.15	-0.13	-0.0[illegible]	-0.15

LOWER SURFACE

percent chord	Sta. 0.0[illegible]	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.737	Sta. 0.960
00.00	0.20	-0.47	-0.[illegible]0	0.17	-1.15	-1.59
1.25	0.36	0.45	0.45	0.37	0.48	0.00
2.5	0.26	0.37	0.37	0.28	0.46	0.42
5.0	0.17	0.2[illegible]	0.25	0.12	0.33	0.23
7.5	0.10	0.14	0.17	0.12	0.21	0.13
10.0	0.04	0.0[illegible]	0.11	0.05	0.16	0.07
15.0	-0.03	0.00	0.03	-0.02	0.07	-0.03
20.0	-0.07	-0.04	-0.02	0.02	0.03	-0.08
25.0	-0.10	-0.07	-0.04	-0.03	-0.02	-0.15
30.0	-0.12	-0.0[illegible]	-0.05	-0.05	-0.04	-0.16
40.0	-0.13	-0.03	-0.07	-0.07	-0.09	-0.19
50.0	-0.10	-0.05	-0.03	-0.07	0.00	-0.18
60.0	-0.03	0.01	0.02	-0.04	-0.08	-0.11
70.0	0.03	0.08	0.08	-0.02	-0.06	-0.13
80.0	0.34	0.36	0.34	0.03	0.00	-0.08
90.0	0.18	0.12	0.17	0.09	0.04	-0.03

Figure 19 (Cont'd).- Pressure coefficient values with
Angle of Attack $= 4^{\circ}$
Flap Deflection $= 15^{\circ}$
and $R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

C[illegible]
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-0.62	-2.25	-3.22	-0.53	-4.54	-2.66
1.25	-1.63	-2.56	-3.01	-1.42	-4.48	
2.5	-1.34	-1.75	-2.20	-1.19	-2.94	-1.77
5.0	-1.13	-1.49	-1.75	-1.04	-2.10	-1.53
7.5	-0.99	-1.25	-1.48	-0.90	-1.69	-1.27
10.0	-0.94	-1.19	-1.32	-0.88	-1.45	-1.27
15.0	-0.85	-1.04	-1.13	-1.17	-1.21	-1.06
20.0	-0.83	-0.98	-1.05	-1.07	-1.07	-0.90
25.0	-0.80	-0.93	-0.98	-1.00	-0.98	-0.79
30.0	-0.79	-0.86	-0.90	-0.92	-0.90	-0.60
40.0	-0.72	-0.77	-0.80	-0.79	-0.75	-0.58
50.0	-0.63	-0.67	-0.67	-0.62	-0.58	-0.48
60.0	-0.53	-0.56	-0.55	-0.48	-0.37	-0.43
70.0	-0.43	-0.47	-0.44	-0.36	-0.32	-0.37
80.0	-0.43	-0.47	-0.47	-0.24	-0.17	-0.33
80.0f	-0.79	-0.91	-0.91			
85.0	-0.35	-0.35	-0.35			
90.0	-0.20	-0.17	-0.17	-0.16	-0.14	-0.30

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-0.62	-2.25	-3.22	-0.53	-4.54	-2.66
1.25	0.50	0.45	0.40	0.48	0.20	
2.5	0.46	0.48	0.47	0.41	0.43	0.42
5.0	0.37	0.42	0.43	0.32	0.48	0.34
7.5	0.30	0.35	0.35	0.25	0.41	0.26
10.0	0.23	0.29	0.30	0.18	0.36	0.19
15.0	0.14	0.19	0.20	0.10	0.27	0.09
20.0	0.09	0.13	0.15	0.18	0.20	0.08
25.0	0.05	0.09	0.10	0.13	0.13	-0.05
30.0	0.02	0.07	0.08	0.08	0.08	-0.10
40.0	-0.01	0.03	0.04	0.03	0.03	-0.16
50.0	0.00	0.05	0.05	0.02	0.00	-0.17
60.0	0.03	0.08	0.07	0.02	-0.03	0.00
70.0	0.08	0.13	0.13	0.03	-0.03	-0.15
80.0	0.38	0.38	0.38	0.05	0.02	-0.11
90.0	0.22	0.20	0.20	0.09	0.03	-0.07

Figure 19.- Pressure Coefficient values with
Angle of Attack = 8^{o}
Flap Deflection = 15^{o}
and $R_e = 2.70 \times 10^6$

CON[illegible]
INF[illegible]

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-1.87	-4.95	-6.70	-3.71	-1.49	-0.82
1.25	-2.86	-3.40	-4.37	-3.13	-1.29	
2.5	-1.97	-2.76	-3.37	-2.88	-1.32	-0.72
5.0	-1.60	-2.17	-2.54	-2.60	-1.34	-0.72
7.5	-1.36	-1.78	-2.10	-2.35	-1.34	-0.71
10.0	-1.28	-1.63	-1.85	-2.13	-1.32	-0.73
15.0	-1.11	-1.38	-1.53	-1.85	-1.26	-0.73
20.0	-1.04	-1.24	-1.38	-1.61	-1.21	-0.72
25.0	-0.99	-1.15	-1.24	-1.43	-1.16	-0.71
30.0	-0.96	-1.06	-1.13	-1.29	-1.09	-0.59
40.0	-0.84	-0.91	-0.97	-1.06	-0.99	-0.66
50.0	-0.72	-0.76	-0.81	-0.87	-0.90	-0.62
60.0	-0.61	-0.63	-0.66	-0.71	-0.81	-0.61
70.0	-0.50	-0.52	-0.54	-0.57	-0.72	-0.59
80.0	-0.45	-0.49	-0.61	-0.45	-0.64	-0.57
80.0f	-0.82	-0.90	-0.48			
85.0	-0.37	-0.35	-0.32			
90.0	-0.21	-0.19	-0.25	-0.45	-0.55	-0.55

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-1.87	-4.95	-6.70	-3.71	-1.49	-0.82
1.25	0.49	0.19	0.00	0.11	0.36	
2.5	0.55	0.45	0.37	0.42	0.49	0.42
5.0	0.50	0.51	0.50	0.54	0.50	0.32
7.5	0.45	0.48	0.48	0.52	0.44	0.25
10.0	0.39	0.44	0.45	0.47	0.40	0.19
15.0	0.29	0.35	0.37	0.38	0.30	0.0[illegible]
20.0	0.23	0.29	0.30	0.30	0.24	0.0[illegible]
25.0	0.19	0.24	0.25	0.24	0.17	-0.0[illegible]
30.0	0.14	0.20	0.22	0.19	0.12	-0.10
40.0	0.10	0.13	0.15	0.12	0.03	-0.19
50.0	0.08	0.13	0.13	0.07	0.00	-0.2[illegible]
60.0	0.11	0.14	0.13	0.05	-0.07	-0.01
70.0	0.13	0.18	0.17	0.03	-0.09	-0.2[illegible]
80.0	0.40	0.40	0.34	0.03	-0.08	-0.21
90.0	0.24	0.22	0.15	0.04	-0.10	-0.17

Figure 19.- Pressure Coefficient values with
Ange of Attack = 12^{o}
Flap Deflection = 15^{o}
and $R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-2.98	-6.24	-2.30	-1.40	-0.90	-0.65
1.25	-3.38	-4.26	-1.83	-1.13	-0.77	
2.5	-2.55	-3.48	-1.85	-1.14	-0.77	-0.62
5.0	-1.98	-2.88	-1.84	-1.15	-0.79	-0.62
7.5	-1.68	-2.41	-1.79	-1.14	-0.78	-0.36
10.0	-1.49	-2.26	-1.73	-1.13	-0.78	-0.62
15.0	-1.36	-1.82	-1.64	-1.09	-0.77	-0.63
20.0	-1.25	-1.61	-1.55	-1.07	-0.76	-0.62
25.0	-1.18	-1.46	-1.47	-1.04	-0.75	-0.62
30.0	-1.13	-1.32	-1.39	-1.03	-0.74	-0.53
40.0	-0.99	-1.14	-1.27	-0.99	-0.74	-0.62
50.0	-0.86	-0.98	-1.15	-0.95	-0.73	-0.62
60.0	-0.74	-0.83	-1.04	-0.90	-0.72	-0.62
70.0	-0.61	-0.72	-0.94	-0.84	-0.70	-0.62
80.0	-0.56	-0.58	-0.83	-0.79	-0.67	-0.62
80.0f	-0.99	-1.01	-0.77			
85.0	-0.46	-0.46	-0.72			
90.0	-0.27	-0.33	-0.66	-0.72	-0.63	-0.59

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-2.98	-6.24	-2.30	-1.40	-0.90	-0.65
1.25	0.32	-0.04	0.22	0.32	0.38	
2.5	0.53	0.39	0.46	0.47	0.48	0.39
5.0	0.58	0.56	0.54	0.52	0.48	0.33
7.5	0.55	0.56	0.53	0.49	0.42	0.25
10.0	0.50	0.56	0.49	0.45	0.38	0.19
15.0	0.43	0.45	0.41	0.37	0.29	0.09
20.0	0.36	0.38	0.34	0.30	0.22	0.02
25.0	0.30	0.33	0.28	0.23	0.17	-0.05
30.0	0.26	0.27	0.25	0.18	0.10	-0.12
40.0	0.20	0.21	0.17	0.09	0.01	-0.20
50.0	0.15	0.17	0.13	0.03	0.00	-0.23
60.0	0.16	0.17	0.12	-0.02	-0.12	0.09
70.0	0.17	0.18	0.13	-0.06	-0.15	-0.26
80.0	0.43	0.36	0.29	-0.09	-0.15	-0.24
90.0	0.26	0.17	0.07	-0.13	-0.19	-0.03

Figure 19.- Pressure Coefficient values with
Angle of Attack = 16^{o}
Flap Deflection = 15^{o}
and $R_e = 2.70 \times 10^{6}$

CONFIDENTIAL
INFORMATION

CONFIDENTIAL INFORMATION

UPPER SURFACE

percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-4.92	-2.15	-1.62	-1.14	-0.84	-0.61
1.25	-3.88	-1.96	-1.27	-0.90	-0.69	
2.5	-3.19	-1.95	-1.29	-0.90	-0.69	-0.61
5.0	-2.44	-1.89	-1.29	-0.89	-0.70	-0.61
7.5	-2.04	-1.95	-1.28	-0.89	-0.69	-0.36
10.0	-1.85	-1.81	-1.26	-0.87	-0.69	-0.61
15.0	-1.56	-1.72	-1.22	-0.86	-0.69	-0.61
20.0	-1.45	-1.66	-1.19	-0.85	-0.69	-0.61
25.0	-1.34	-1.59	-1.17	-0.84	-0.69	-0.61
30.0	-1.29	-1.51	-1.15	-0.84	-0.69	-0.52
40.0	-1.18	-1.39	-1.14	-0.84	-0.69	-0.61
50.0	-1.08	-1.28	-1.12	-0.83	-0.69	-0.61
60.0	-0.96	-1.16	-1.09	-0.83	-0.69	-0.61
70.0	-0.84	-1.06	-1.03	-0.81	-0.67	-0.61
80.0	-0.78	-0.94	-0.98	-0.79	-0.67	-0.61
80.0f	-1.29	-1.41	-0.92			
85.0	-0.67	-0.84	-0.90			
90.0	-0.45	-0.72	-0.84	-0.77	-0.64	-0.39

LOWER SURFACE

percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-4.92	-2.15	-1.62	-1.14	-0.84	-0.61
1.25	0.13	0.13	0.25	0.32	0.34	
2.5	0.50	0.47	0.48	0.48	0.47	0.37
5.0	0.64	0.61	0.58	0.55	0.50	0.34
7.5	0.64	0.61	0.55	0.53	0.46	0.29
10.0	0.61	0.59	0.53	0.49	0.42	0.24
15.0	0.55	0.50	0.46	0.42	0.34	0.13
20.0	0.45	0.44	0.38	0.33	0.27	0.06
25.0	0.40	0.38	0.35	0.27	0.20	-0.02
30.0	0.34	0.34	0.28	0.22	0.14	-0.07
40.0	0.26	0.24	0.19	0.12	0.04	-0.17
50.0	0.20	0.20	0.14	0.03	0.00	-0.21
60.0	0.19	0.17	0.10	-0.02	-0.10	-0.00
70.0	0.18	0.17	0.11	-0.03	-0.15	-0.25
80.0	0.43	0.37	0.28	-0.12	-0.16	-0.25
90.0	0.24	0.11	0.00	-0.17	-0.20	-0.03

Figure 19 (Cont'd).- Pressure coefficient values with
Angle of Attack = 20°
Flap deflection = 15°
and R_e = 2.70 x 10^6

CONFIDENTIAL INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.950
00.00	-4.00	-1.62	-1.25	-1.07	-0.79	-0.61
1.25	-2.97	-1.58	-1.20	-0.88	-0.71	
2.5	-2.73	-1.58	-1.21	-0.88	-0.72	-0.61
5.0	-2.45	-1.55	-1.20	-0.88	-0.72	-0.61
7.5	-2.23	-1.51	-1.17	-0.87	-0.71	-0.56
10.0	-2.07	-1.49	-1.17	-0.86	-0.71	-0.61
15.0	-1.84	-1.46	-1.13	-0.85	-0.71	-0.61
20.0	-1.68	-1.44	-1.12	-0.85	-0.71	-0.61
25.0	-1.55	-1.41	-1.08	-0.84	-0.71	-0.62
30.0	-1.48	-1.39	-1.07	-0.84	-0.71	-0.53
40.0	-1.34	-1.34	-1.06	-0.83	-0.70	-0.62
50.0	-1.25	-1.30	-1.05	-0.82	-0.70	-0.62
60.0	-1.16	-1.24	-1.02	-0.81	-0.69	-0.62
70.0	-1.08	-1.18	-1.00	-0.81	-0.68	-0.61
80.0	-1.00	-1.12	-0.99	-0.80	-0.67	-0.61
80.0f	-1.56	-1.67	-0.92			
85.0	-0.91	-1.08	-0.92			
90.0	-0.73	-0.97	-0.88	-0.80	-0.65	-0.20

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.950
00.00	-4.00	-1.62	-1.25	-1.07	-0.79	-0.61
1.25	0.15	0.12	0.15	0.23	0.24	
2.5	0.55	0.45	0.45	0.44	0.44	0.34
5.0	0.72	0.63	0.58	0.56	0.53	0.37
7.5	0.74	0.65	0.59	0.56	0.51	[illegible]
10.0	0.71	0.64	0.58	0.54	0.48	0.29
15.0	0.65	0.57	0.52	0.47	0.42	0.19
20.0	0.57	0.51	0.46	0.41	0.36	0.11
25.0	0.50	0.45	0.39	0.34	0.29	0.03
30.0	0.44	0.40	0.35	0.30	0.22	-0.05
40.0	0.35	0.30	0.25	0.18	0.11	-0.13
50.0	0.27	0.24	0.19	0.09	0.00	-0.19
60.0	0.24	0.20	0.14	-0.03	-0.05	0.00
70.0	0.20	0.18	0.13	-0.04	-0.11	-0.25
80.0	0.45	0.37	0.29	-0.10	-0.14	-0.24
90.0	0.20	0.07	0.00	-0.15	-0.19	-0.01

Figure 19.- Pressure Coefficient values with Angle of Attack = 24° Flap Deflection = 15° and $R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-2.13	-1.33	-1.14	-0.87	-0.77	-0.61
1.25	-1.71	-1.33	-1.15	-0.89	-0.74	
2.5	-1.68	-1.33	-1.15	-0.89	-0.74	-0.62
5.0	-1.61	-1.32	-1.14	-0.89	-0.74	-0.62
7.5	-1.59	-1.30	-1.12	-0.89	-0.74	-0.57
10.0	-1.55	-1.31	-1.12	-0.87	-0.74	-0.62
15.0	-1.47	-1.27	-1.09	-0.87	-0.74	-0.62
20.0	-1.43	-1.24	-1.09	-0.87	-0.74	-0.62
25.0	-1.37	-1.24	-1.07	-0.87	-0.74	-0.62
30.0	-1.34	-1.23	-1.05	-0.87	-0.74	-0.54
40.0	-1.28	-1.21	-1.04	-0.86	-0.73	-0.62
50.0	-1.24	-1.19	-1.02	-0.84	-0.72	-0.62
60.0	-1.21	-1.18	-1.00	-0.84	-0.72	-0.62
70.0	-1.17	-1.14	-0.99	-0.83	-0.71	-0.62
80.0	-1.13	-1.11	-0.97	-0.82	-0.03	-0.61
80.0f	-1.75	-1.70	-0.92			
85.0	-1.09	-1.11	-0.94			
90.0	-0.96	-1.03	-0.84	-0.81	-0.69	-0.21

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-2.13	-1.33	-1.14	-0.87	-0.77	-0.61
1.25	0.20	0.08	0.08	0.12	0.13	
2.5	0.61	0.45	0.42	0.38	0.38	0.29
5.0	0.76	0.64	0.59	0.56	0.54	0.39
7.5	0.77	0.67	0.64	0.58	0.55	0.36
10.0	0.75	0.67	0.63	0.58	0.53	0.32
15.0	0.68	0.63	0.58	0.53	0.48	0.25
20.0	0.62	0.56	0.52	0.48	0.42	0.17
25.0	0.55	0.51	0.46	0.42	0.36	0.10
30.0	0.49	0.45	0.42	0.36	0.29	0.03
40.0	0.39	0.36	0.31	0.24	0.18	-0.08
50.0	0.31	0.29	0.23	0.15	0.00	-0.15
60.0	0.26	0.24	0.18	0.10	0.00	0.00
70.0	0.21	0.20	0.15	-0.01	-0.08	-0.23
80.0	0.45	0.39	0.32	-0.08	-0.11	-0.23
90.0	0.17	0.07	0.00	-0.13	-0.18	-0.01

Figure 19.- Pressure Coefficient values with
Angle of Attack = 28°
Flap Deflection = 15°
and $R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-1.57	-1.23	-1.09	-0.89	-0.74	-0.64
1.25	-1.47	-1.22	-1.10	-0.89	-0.72	
2.5	-1.44	-1.22	-1.09	-0.88	-0.73	-0.65
5.0	-1.40	-1.24	-1.09	-0.87	-0.73	-0.61
7.5	-1.39	-1.19	-1.07	-0.87	-0.72	-0.57
10.0	-1.34	-1.24	-1.07	-0.86	-0.73	-0.60
15.0	-1.34	-1.18	-1.04	-0.85	-0.73	-0.60
20.0	-1.30	-1.18	-1.04	-0.85	-0.73	-0.62
25.0	-1.27	-1.17	-1.03	-0.84	-0.73	-0.63
30.0	-1.27	-1.15	-1.02	-0.84	-0.72	-0.55
40.0	-1.22	-1.16	-1.00	-0.83	-0.72	-0.64
50.0	-1.20	-1.15	-0.99	-0.82	-0.71	-0.62
60.0	-1.19	-1.13	-0.97	-0.81	-0.71	-0.63
70.0	-1.16	-1.10	-0.97	-0.80	-0.70	-0.44
80.0	-1.14	-1.04	-0.94	-0.79	-0.03	-0.58
80.0f	-1.78	-1.65	-0.89			
85.0	-1.14	-1.02	-0.90			
90.0	-1.04	-0.99	-0.88	-0.79	-0.69	-0.59

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-1.57	-1.23	-1.09	-0.89	-0.74	-0.64
1.25	0.28	0.05	0.03	0.07	0.08	
2.5	0.61	0.42	0.38	0.35	0.35	0.25
5.0	0.78	0.63	0.58	0.57	0.53	0.38
7.5	0.80	0.67	0.64	0.61	0.56	0.34
10.0	0.79	0.70	0.64	0.61	0.55	0.31
15.0	0.74	0.64	0.61	0.56	0.52	0.23
20.0	0.67	0.60	0.55	0.52	0.46	0.18
25.0	0.60	0.54	0.50	0.46	0.40	0.11
30.0	0.53	0.48	0.45	0.40	0.33	0.04
40.0	0.43	0.38	0.35	0.28	0.22	-0.08
50.0	0.34	0.32	0.28	0.19	0.00	-0.13
60.0	0.29	0.25	0.21	0.11	0.03	-0.18
70.0	0.23	0.22	0.18	0.03	-0.04	-0.23
80.0	0.46	0.38	0.33	-0.04	-0.08	-0.23
90.0	0.18	0.07	0.03	-0.11	-0.17	-0.23

Figure 19.- Pressure Coefficient values with
Angle of Attack = 30°
Flap Deflection = 15°
and $R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

CONFIDENTIAL INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	0.38	0.41	0.48	0.44	0.41	0.43
1.25	0.15	0.08	-0.07	-0.10	0.03	
2.5	0.03	-0.03	-0.14	-0.16	-0.08	-0.05
5.0	-0.10	-0.16	-0.25	-0.28	-0.20	-0.12
7.5	-0.13	-0.20	-0.28	-0.30	-0.21	-0.16
10.0	-0.19	-0.25	-0.31	-0.30	-0.22	-0.21
15.0	-0.25	-0.31	-0.34	-0.32	-0.26	-0.22
20.0	-0.30	-0.37	-0.41	-0.36	-0.28	-0.23
25.0	-0.35	-0.41	-0.44	-0.39	-0.31	-0.25
30.0	-0.38	-0.43	-0.46	-0.41	-0.34	-0.21
40.0	-0.41	-0.48	-0.51	-0.43	-0.34	-0.26
50.0	-0.41	-0.49	-0.49	-0.38	-0.30	-0.21
60.0	-0.40	-0.50	-0.48	-0.30	-0.24	-0.17
70.0	-0.41	-0.51	-0.48	-0.23	-0.16	-0.09
80.0	-0.61	-0.77	-0.66	-0.16	-0.03	-0.05
80.0f	-1.16	-1.28	-1.02			
85.0	-0.66	-0.63	-0.46			
90.0	-0.40	-0.25	-0.34	-0.12	-0.04	0.08

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	0.38	0.41	0.48	0.44	0.41	0.43
1.25	-0.25	-0.29	-0.20	-0.15	-0.29	
2.5	-0.31	-0.30	-0.23	-0.18	-0.27	-0.40
5.0	-0.30	-0.30	-0.23	-0.20	-0.27	-0.37
7.5	-0.28	-0.30	-0.25	-0.23	-0.33	-0.36
10.0	-0.30	-0.31	-0.26	-0.25	-0.34	-0.35
15.0	-0.32	-0.31	-0.28	-0.27	-0.34	-0.33
20.0	-0.30	-0.31	-0.26	-0.27	-0.33	-0.31
25.0	-0.30	-0.28	-0.25	-0.27	-0.31	-0.31
30.0	-0.28	-0.25	-0.21	-0.26	-0.33	-0.30
40.0	-0.23	-0.18	-0.15	-0.23	-0.30	-0.26
50.0	-0.17	-0.07	-0.05	-0.18	0.00	-0.21
60.0	-0.05	-0.04	0.03	-0.12	-0.19	-0.15
70.0	-0.05	0.15	0.13	-0.08	-0.12	-0.09
80.0	-0.58	0.56	0.48	-0.02	-0.03	-0.03
90.0	-0.32	0.31	0.22	0.07	0.03	0.00

Figure 20 (Cont'd).- Pressure coefficient values with
Angle of Attack = -4°
Flap Deflection = 30°
and $R_e = 2.70 \times 10^6$

CONFIDENTIAL INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	0.43	0.17	0.03	0.05	0.08	0.02
1.25	-0.33	-0.63	-0.92	-1.14	-1.10	
2.5	-0.38	-0.63	-0.82	-0.94	-0.94	-0.74
5.0	-0.44	-0.63	-0.78	-0.85	-0.82	-0.55
7.5	-0.43	-0.58	-0.72	-0.78	-0.70	-0.47
10.0	-0.46	-0.61	-0.69	-0.69	-0.64	-0.48
15.0	-0.47	-0.60	-0.66	-0.64	-0.59	-0.42
20.0	-0.50	-0.63	-0.69	-0.64	-0.55	-0.40
25.0	-0.52	-0.64	-0.69	-0.65	-0.56	-0.38
30.0	-0.55	-0.64	-0.68	-0.64	-0.56	-0.32
40.0	-0.56	-0.65	-0.69	-0.60	-0.50	-0.32
50.0	-0.55	-0.63	-0.63	-0.50	-0.42	-0.25
60.0	-0.52	-0.60	-0.58	-0.42	-0.33	-0.19
70.0	-0.49	-0.60	-0.57	-0.33	-0.23	-0.09
80.0	-0.68	-0.84	-0.74	-0.23	-0.03	-0.08
80.0f	-1.20	-1.33	-1.04			
85.0	-0.69	-0.65	-0.47			
90.0	-0.42	-0.09	-0.36	-0.15	-0.08	-0.06

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	0.43	0.17	0.03	0.05	0.08	0.02
1.25	0.15	0.27	0.33	0.38	0.38	[illegible]
2.5	0.08	0.17	0.22	0.28	0.30	[illegible]
5.0	0.00	0.08	0.12	0.17	0.14	[illegible]
7.5	-0.03	0.02	0.05	0.08	0.03	[illegible]
[illegible]	-0.08	-0.02	0.00	0.03	-0.02	[illegible]
[illegible]	-0.13	-0.08	-0.06	-0.04	-0.08	-0.13
[illegible]	-0.13	-0.10	-0.08	-0.08	-0.11	-0.15
[illegible]	-0.15	-0.10	-0.08	-0.10	-0.13	-0.21
30.0	-0.15	-0.10	-0.08	-0.12	-0.17	-0.22
40.0	-0.13	-0.07	-0.05	-0.12	-0.18	-0.23
50.0	-0.08	0.02	0.02	-0.10	0.00	-0.15
60.0	0.02	0.10	0.08	-0.07	-0.13	0.00
70.0	0.10	0.20	0.18	-0.04	-0.08	-0.11
80.0	0.58	0.57	0.48	0.01	-0.02	[illegible]
90.0	0.35	0.33	0.23	0.08	0.03	[illegible]

Figure 20.- Pressure Coefficient values with
Angle of Attack = 0°
Flap Deflection = 30°
and $R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-0.05	-1.04	-1.59	-1.88	-2.18	-2.32
1.25	-1.07	-1.69	-2.13	-2.84	-3.09	
2.5	-0.97	-1.36	-1.65	-1.90	-2.00	-1.77
5.0	-0.87	-1.15	-1.34	-1.55	-1.58	-1.19
7.5	-0.79	-1.00	-1.17	-1.31	-1.26	-0.99
10.0	-0.77	-0.98	-1.09	-1.14	-1.12	-0.92
15.0	-0.74	-0.90	-0.98	-1.00	-0.97	-0.75
20.0	-0.74	-0.89	-0.94	-0.94	-0.88	-0.67
25.0	-0.74	-0.88	-0.92	-0.90	-0.84	-0.61
30.0	-0.75	-0.84	-0.88	-0.85	-0.79	-0.46
40.0	-0.72	-0.81	-0.84	-0.77	-0.68	-0.43
50.0	-0.67	-0.75	-0.75	-0.64	-0.54	-0.38
60.0	-0.61	-0.70	-0.69	-0.51	-0.42	-0.33
70.0	-0.58	-0.69	-0.64	-0.39	-0.30	-0.27
80.0	-0.74	-0.89	-0.76	-0.28	-0.20	-0.22
80.0f	-1.20	-1.30	-0.99			
85.0	-0.67	-0.64	-0.45			
90.0	-0.43	-0.26	-0.34	-0.18	-0.12	-0.23

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-0.05	-1.04	-1.59	-1.88	-2.18	-2.32
1.25	0.43	0.47	0.45	0.43	0.43	
2.5	0.35	0.41	0.42	0.46	0.48	0.44
5.0	0.25	0.31	0.33	0.38	0.38	0.27
7.5	0.19	0.23	0.25	0.30	0.28	0.17
10.0	0.13	0.18	0.20	0.25	0.23	0.10
15.0	0.06	0.10	0.12	0.16	0.13	0.00
20.0	0.02	0.07	0.08	0.10	0.08	-0.07
25.0	-0.02	0.04	0.05	0.05	0.03	-0.12
30.0	-0.03	0.03	0.05	0.03	-0.02	-0.15
40.0	-0.03	0.03	0.04	-0.01	-0.06	-0.20
50.0	0.00	0.08	0.08	-0.02	-0.08	-0.20
60.0	0.07	0.15	0.12	-0.02	-0.08	0.00
70.0	0.13	0.23	0.19	0.00	-0.06	-0.15
80.0	0.60	0.57	0.47	0.25	0.00	-0.10
90.0	0.37	0.33	0.22	0.67	0.03	-0.03

Figure 20 (cont'd.).- Pressure Coefficient values with
Angle of Attack = 4°
Flap Deflection = 30°
and $R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-0.97	-3.18	-4.90	-5.57	-5.39	-1.68
1.25	-1.93	-2.86	-3.65	-4.82	-4.45	
2.5	-1.50	-2.16	-2.82	-3.34	-3.50	-1.29
5.0	-1.29	-1.78	-2.17	-2.45	-2.65	-1.33
7.5	-1.13	-1.50	-1.82	-2.01	-2.16	-1.31
10.0	-1.08	-1.40	-1.61	-1.72	-1.87	-1.28
15.0	-0.97	-1.24	-1.39	-1.44	-1.51	-1.17
20.0	-0.95	-1.16	-1.28	-1.30	-1.30	-1.05
25.0	-0.92	-1.11	-1.20	-1.20	-1.17	-0.94
30.0	-0.92	-1.04	-1.11	-1.12	-1.06	-0.71
40.0	-0.84	-0.96	-1.01	-0.96	-0.86	-0.69
50.0	-0.76	-0.86	-0.88	-0.78	-0.69	-0.59
60.0	-0.69	-0.77	-0.76	-0.61	-0.54	-0.53
70.0	-0.63	-0.73	-0.69	-0.47	-0.41	-0.45
80.0	-0.76	-0.89	-0.77	-0.34	-0.30	-0.45
80.0f	-1.18	-1.23	-0.91			
85.0	-0.64	-0.61	-0.42			
90.0	-0.40	-0.24	-0.32	-0.22	-0.21	-0.43

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-0.97	-3.18	-4.90	-5.57	-5.39	-1.68
1.25	0.50	0.38	0.20	0.07	0.07	
2.5	0.49	0.49	0.42	0.36	0.39	0.40
5.0	0.41	0.46	0.47	0.48	0.50	0.32
7.5	0.34	0.40	0.42	0.46	0.46	0.25
10.0	0.29	0.36	0.38	0.41	0.41	0.19
15.0	0.20	0.27	0.30	0.32	0.30	0.09
20.0	0.16	0.22	0.25	0.26	0.24	0.01
25.0	0.12	0.19	0.21	0.20	0.18	-0.05
30.0	0.10	0.16	0.19	0.17	0.12	-0.10
40.0	0.08	0.13	0.15	0.10	0.05	-0.17
50.0	0.08	0.16	0.16	0.07	0.00	-0.19
60.0	0.13	0.20	0.19	0.05	-0.03	-0.19
70.0	0.19	0.27	0.24	0.04	-0.03	-0.18
80.0	0.62	0.40	0.47	0.05	0.00	-0.14
90.0	0.39	0.35	0.24	0.08	0.00	-0.13

Figure 20 (cont'd.).- Pressure Coefficient values with
Angle of Attack = 8°
Flap Deflection = 30°
and R_e = 2.70 x 10^6

CONFIDENTIAL
INFORMATION

CONFIDENTIAL INFORMATION

UPPER SURFACE

percent chord	Sta. 0.096	Sta. 0.027	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-2.32	-5.87	-6.16	-2.07	-1.20	-0.82
1.25	-3.16	-3.04	-4.09	-1.73	-1.09	
2.5	-2.18	-3.13	-3.44	-1.77	-1.10	-0.74
5.0	-1.77	-2.45	-2.61	-1.78	-1.11	-0.75
7.5	-1.50	-2.01	-2.44	-1.74	-1.10	-0.75
10.0	-1.40	-1.84	-2.19	-1.68	-1.09	-0.76
15.0	-1.23	-1.56	-1.86	-1.57	-1.05	-0.76
20.0	-1.17	-1.43	-1.66	-1.47	-1.02	-0.76
25.0	-1.12	-1.34	-1.50	-1.37	-0.99	-0.76
30.0	-1.08	-1.24	-1.39	-1.29	-0.96	-0.64
40.0	-0.98	-1.12	-1.21	-1.17	-0.90	-0.74
50.0	-0.87	-0.99	-1.05	-1.05	-0.85	-0.73
60.0	-0.77	-0.88	-0.93	-0.95	-0.82	-0.71
70.0	-0.70	-0.82	-0.83	-0.85	-0.77	-0.69
80.0	-0.81	-0.95	-0.78	-0.75	-0.72	-0.68
80.0f	-1.23	-1.22	-0.84			
85.0	-0.68	-0.63	-0.57			
90.0	-0.41	-0.29	-0.43	-0.67	-0.65	-0.66

LOWER SURFACE

percent chord	Sta. 0.096	Sta. 0.027	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-2.52	-5.37	-6.16	-2.07	-1.20	-0.82
1.25	0.44	0.07	-0.04	0.23	0.36	
2.5	0.54	0.41	0.38	0.43	0.47	0.39
5.0	0.53	0.52	0.53	0.51	0.47	0.30
7.5	0.48	0.51	0.53	0.48	0.40	0.22
10.0	0.42	0.48	0.50	0.45	0.36	0.16
15.0	0.35	0.41	0.43	0.37	0.28	0.06
20.0	0.29	0.34	0.36	0.30	0.20	-0.02
25.0	0.24	0.30	0.30	0.23	0.14	-0.08
30.0	0.21	0.26	0.28	0.19	0.08	-0.14
40.0	0.17	0.22	0.22	0.11	0.00	-0.22
50.0	0.16	0.22	0.20	0.06	-0.02	-0.25
60.0	0.19	0.25	0.20	0.02	-0.11	-0.27
70.0	0.24	0.30	0.24	-0.17	-0.14	-0.26
80.0	0.64	0.58	0.47	-0.05	-0.14	-0.25
90.0	0.42	0.36	0.22	-0.08	-0.18	-0.25

Figure 20 (Cont'd).-Pressure coefficient values with
Angle of Attack = 12°
Flap Deflection = 30°
and R_e = 2.70×10^{6}

CONFIDENTIAL INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-3.97	-4.23	-2.06	-1.34	-0.92	-0.67
1.25	-3.64	-3.18	-1.59	-1.04	-0.79	
2.5	-2.86	-2.96	-1.61	-1.05	-0.79	-0.65
5.0	-2.19	-2.70	-1.60	-1.05	-0.80	-0.61
7.5	-1.82	-2.48	-1.57	-1.05	-0.79	-0.57
10.0	-1.66	-2.33	-1.55	-1.04	-0.79	-0.62
15.0	-1.35	-2.03	-1.47	-1.02	-0.79	-0.61
20.0	-1.26	-1.83	-1.43	-1.00	-0.79	-0.63
25.0	-1.18	-1.66	-1.39	-0.99	-0.78	-0.63
30.0	-1.18	-1.52	-1.34	-0.99	-0.77	-0.55
40.0	-1.05	-1.33	-1.28	-0.97	-0.77	-0.62
50.0	-0.98	-1.18	-1.23	-0.93	-0.76	-0.52
60.0	-0.87	-1.07	-1.14	-0.93	-0.75	-0.64
70.0	-0.80	-0.97	-1.06	-0.89	-0.74	-0.45
80.0	-0.92	-0.92	-0.98	-0.84	-0.72	-0.61
80.0f	-1.37	-1.08	-1.00			
85.0	-0.78	-0.77	-0.86			
90.0	-0.47	-0.57	-0.75	-0.82	-0.68	-0.61

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-3.97	-4.23	-2.06	-1.34	-0.93	-0.67
1.25	0.25	0.07	0.22	0.29	0.33	
2.5	0.52	0.45	0.46	0.45	0.45	0.37
5.0	0.61	0.61	0.54	0.52	0.47	0.30
7.5	0.60	0.61	0.53	0.49	0.42	0.23
10.0	0.55	0.57	0.50	0.45	0.38	0.17
15.0	0.48	0.49	0.43	0.38	0.29	0.08
20.0	0.40	0.42	0.37	0.31	0.23	0.00
25.0	0.35	0.37	0.31	0.25	0.17	-0.07
30.0	0.30	0.34	0.28	0.20	0.10	-0.12
40.0	0.25	0.27	0.21	0.10	0.01	-0.20
50.0	0.22	0.25	0.18	0.03	-0.03	-0.24
60.0	0.24	0.27	0.18	-0.02	-0.13	0.00
70.0	0.26	0.30	0.21	-0.07	-0.17	-0.27
80.0	0.66	0.57	0.43	-0.12	-0.18	-0.26
90.0	0.44	0.30	0.30	-0.18	-0.22	-0.08

Figure 20 (cont'd.).- Pressure Coefficient values with
Angle of Attack = 16°
Flap Deflection = 30°
and R_e = 2.70 x10^6

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-5.14	-1.93	-1.56	-1.24	-0.92	-0.64
1.25	-3.97	-1.79	-1.29	-0.95	-0.77	
2.5	-3.27	-1.79	-1.29	-0.95	-0.77	-0.65
5.0	-2.58	-1.75	-1.30	-0.95	-0.77	-0.65
7.5	-2.19	-1.72	-1.29	-0.95	-0.77	-0.64
10.0	-1.97	-1.70	-1.28	-0.94	-0.77	-0.65
15.0	-1.66	-1.63	-1.25	-0.92	-0.77	-0.65
20.0	-1.52	-1.59	-1.23	-0.92	-0.77	-0.65
25.0	-1.42	-1.55	-1.20	-0.92	-0.76	-0.65
30.0	-1.37	-1.49	-1.19	-0.92	-0.76	-0.56
40.0	-1.25	-1.40	-1.17	-0.91	-0.75	-0.65
50.0	-1.17	-1.33	-1.15	-0.90	-0.75	-0.67
60.0	-1.09	-1.25	-1.12	-0.89	-0.75	-0.57
70.0	-1.02	-1.17	-1.09	-0.89	-0.74	-0.67
80.0	-1.07	-1.10	-1.09	-0.88	-0.72	-0.66
80.0f	-1.51	-1.19	-1.10			
85.0	-0.99	-1.00	-0.94			
90.0	-0.67	-0.88	-0.84	-0.89	-0.70	-0.64

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-5.14	-1.93	-1.56	-1.24	-0.92	-0.64
1.25	0.10	0.32	0.18	0.25	0.28	
2.5	0.49	0.47	0.45	0.43	0.43	0.35
5.0	0.67	0.62	0.57	0.53	0.49	0.33
7.5	0.69	0.63	0.57	0.53	0.45	0.28
10.0	0.65	0.61	0.54	0.50	0.42	0.22
15.0	0.58	0.54	0.48	0.43	0.34	0.13
20.0	0.52	0.48	0.42	0.36	0.27	0.03
25.0	0.45	0.43	0.37	0.29	0.21	-0.03
30.0	0.40	0.38	0.33	0.23	0.13	-0.09
40.0	0.33	0.31	0.25	0.13	0.03	-0.19
50.0	0.28	0.28	0.21	0.06	0.00	-0.23
60.0	0.28	0.28	0.19	0.00	-0.12	0.00
70.0	0.26	0.30	0.21	-0.08	-0.17	-0.29
80.0	0.69	0.57	0.45	-0.13	-0.18	-0.28
90.0	0.43	0.27	0.12	-0.20	-0.23	-0.12

Figure 20 (cont'd.).- Pressure Coefficient values with
Angle of Attack = 20°
Flap Deflection = 30°
and $R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-3.30	-1.52	-1.24	-1.09	-0.82	-0.63
1.25	-2.62	-1.49	-1.23	-0.94	-0.76	
2.5	-2.43	-1.50	-1.22	-0.94	-0.76	-0.64
5.0	-2.26	-1.43	-1.21	-0.94	-0.77	-0.64
7.5	-2.11	-1.45	-1.20	-0.96	-0.76	-0.63
10.0	-1.93	-1.45	-1.19	-0.93	-0.76	-0.64
15.0	-1.75	-1.41	-1.17	-0.92	-0.76	-0.63
20.0	-1.51	-1.39	-1.15	-0.92	-0.76	-0.64
25.0	-1.40	-1.36	-1.14	-0.91	-0.76	-0.64
30.0	-1.44	-1.34	-1.13	-0.91	-0.76	-0.56
40.0	-1.33	-1.31	-1.12	-0.90	-0.76	-0.64
50.0	-1.26	-1.28	-1.11	-0.89	-0.75	-0.64
60.0	-1.22	-1.26	-1.09	-0.89	-0.74	-0.65
70.0	-1.17	-1.22	-1.07	-0.89	-0.73	-0.58
80.0	-1.15	-1.17	-1.09	-0.89	-0.71	-0.63
80.0f	-1.56	-1.25	-1.09			
85.0	-1.17	-1.12	-0.97			
90.0	-0.92	-1.01	-0.92	-0.91	-0.70	-0.53

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-3.30	-1.52	-1.24	-1.09	-0.82	-0.63
1.25	0.24	0.13	0.10	0.15	0.19	
2.5	0.58	0.47	0.40	0.39	0.39	0.32
5.0	0.73	0.63	0.55	0.54	0.50	0.37
7.5	0.74	0.65	0.59	0.55	0.49	0.32
10.0	0.70	0.65	0.57	0.54	0.47	0.28
15.0	0.63	0.59	0.53	0.48	0.41	0.19
20.0	0.57	0.55	0.47	0.42	0.34	0.11
25.0	0.51	0.48	0.42	0.45	0.29	0.03
30.0	0.45	0.44	0.37	0.30	0.22	-0.03
40.0	0.37	0.36	0.29	0.19	0.10	-0.14
50.0	0.30	0.32	0.25	0.10	0.00	-0.20
60.0	0.30	0.30	0.22	0.03	-0.07	-0.05
70.0	0.29	0.31	0.24	-0.05	-0.13	-0.27
80.0	0.69	0.53	0.46	-0.12	-0.13	-0.26
90.0	0.41	0.25	0.12	-0.19	-0.22	-0.27

Figure 20 (Cont'd).- Pressure coefficient values with
Angle of Attack = 24°
Flap Deflection = 30°
and $R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-1.95	-1.28	-1.13	-0.80	-0.75	-0.64
1.25	-1.61	-1.28	-1.13	-0.94	-0.74	
2.5	-1.58	-1.29	-1.14	-0.92	-0.74	-0.64
5.0	-1.52	-1.28	-1.14	-0.92	-0.74	-0.65
7.5	-1.49	-1.27	-1.12	-0.88	-0.74	-0.65
10.0	-1.45	-1.27	-1.13	-0.85	-0.74	-0.65
15.0	-1.39	-1.24	-1.10	-0.90	-0.74	-0.65
20.0	-1.35	-1.23	-1.10	-0.90	-0.74	-0.65
25.0	-1.31	-1.22	-1.09	-0.89	-0.74	-0.66
30.0	-1.29	-1.21	-1.07	-0.89	-0.74	-0.57
40.0	-1.24	-1.20	-1.07	-0.89	-0.74	-0.66
50.0	-1.21	-1.20	-1.05	-0.87	-0.72	-0.67
60.0	-1.19	-1.19	-1.03	-0.86	-0.72	-0.67
70.0	-1.17	-1.17	-1.00	-0.85	-0.71	-0.65
80.0	-1.17	-1.14	-1.00	-0.85	-0.71	-0.65
80.0f	-1.49	-1.29	-1.07			
85.0	-1.24	-1.15	-0.99			
90.0	-1.10	-1.05	-0.85	-0.87	-0.71	-0.65

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-1.95	-1.28	-1.13	-0.80	-0.75	-0.64
1.25	0.29	0.07	0.02	0.03	0.08	0.
2.5	0.45	0.43	0.37	0.32	0.34	0.27
5.0	0.78	0.64	0.58	0.52	0.52	0.37
7.5	0.79	0.69	0.62	0.58	0.53	0.34
10.0	0.78	0.70	0.63	0.55	0.50	0.30
15.0	0.70	0.66	0.60	0.55	0.48	0.23
20.0	0.65	0.61	0.55	0.50	0.42	0.14
25.0	0.60	0.56	0.50	0.43	0.36	0.07
30.0	0.54	0.52	0.45	0.38	0.30	0.00
40.0	0.45	0.43	0.36	0.28	0.18	-0.11
50.0	0.38	0.38	0.31	0.18	0.05	-0.18
60.0	0.35	0.35	0.27	0.09	-0.01	-0.05
70.0	0.33	0.35	0.28	0.00	-0.08	-0.27
80.0	0.72	0.62	0.50	-0.08	-0.13	-0.27
90.0	0.41	0.28	0.14	-0.15	-0.20	-0.28

Figure 20 (cont'd.).- Pressure Coefficient values with
Angle of Attack = 28°
Flap Deflection = 30°
and $R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-1.51	-1.21	-1.13	-0.95	-0.75	-0.66
1.25	-1.39	-1.21	-1.14	-0.94	-0.74	
2.5	-1.37	-1.22	-1.13	-0.94	-0.74	-0.66
5.0	-1.33	-1.21	-1.13	-0.93	-0.74	-0.63
7.5	-1.31	-1.20	-1.11	-0.92	-0.74	-0.61
10.0	-1.29	-1.20	-1.11	-0.92	-0.74	-0.64
15.0	-1.26	-1.19	-1.09	-0.91	-0.74	-0.64
20.0	-1.24	-1.18	-1.09	-0.90	-0.74	-0.65
25.0	-1.21	-1.18	-1.08	-0.89	-0.74	-0.65
30.0	-1.19	-1.16	-1.07	-0.89	-0.74	-0.56
40.0	-1.18	-1.16	-1.06	-0.88	-0.74	-0.66
50.0	-1.17	-1.16	-1.04	-0.87	-0.74	-0.65
60.0	-1.16	-1.15	-1.02	-0.86	-0.74	-0.66
70.0	-1.15	-1.14	-1.01	-0.85	-0.73	-0.46
80.0	-1.14	-1.13	-0.99	-0.85	-0.72	-0.62
80.0f	-1.45	-1.27	-1.05			
85.0	-1.24	-1.14	-0.99			
90.0	-1.11	-1.04	-0.93	-0.85	-0.72	[illegible]

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-1.51	-1.21	-1.13	-0.95	-0.75	[illegible]
[illegible]	0.29	0.02	-0.03	0.00	0.04	[illegible]
[illegible]	0.61	0.42	0.34	0.31	0.32	[illegible]
[illegible]	0.79	0.64	0.56	0.55	0.52	[illegible]
[illegible]	0.82	0.71	0.62	0.60	0.55	[illegible]
[illegible]	0.81	0.72	0.64	0.61	0.55	[illegible]
[illegible]	0.76	0.69	0.61	0.57	0.51	0.27
20.0	0.71	0.64	0.56	0.53	0.45	0.15
25.0	0.64	0.60	0.52	0.46	0.39	0.08
30.0	0.59	0.55	0.47	0.41	0.33	0.01
40.0	0.50	0.47	0.39	0.30	0.21	-0.11
50.0	0.43	0.42	0.33	0.21	0.07	-0.17
60.0	0.39	0.39	0.29	0.13	0.03	-0.22
70.0	0.37	0.38	0.29	0.02	-0.06	-0.26
80.0	0.74	0.63	0.50	-0.07	-0.10	-0.28
90.0	0.44	0.29	0.14	-0.14	-0.20	-0.27

Figure 20 (cont'd.).- Pressure Coefficient values with
Angle of Attack = 30°
Flap Deflection = 30°
and $R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

CONFIDENTIAL INFORMATION

UPPER SURFACE

percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	0.44	0.46	0.60	0.45	0.48	0.46
1.25	0.13	-0.09	-0.36	-0.42	-0.25	
2.5	-0.02	-0.19	-0.39	-0.42	-0.31	-0.25
5.0	-0.14	-0.30	-0.46	-0.48	-0.38	-0.25
7.5	-0.19	-0.32	-0.46	-0.48	-0.36	-0.26
10.0	-0.25	-0.38	-0.48	-0.45	-0.35	-0.30
15.0	-0.31	-0.44	-0.50	-0.46	-0.38	-0.30
20.0	-0.37	-0.49	-0.56	-0.50	-0.38	-0.30
25.0	-0.42	-0.54	-0.60	-0.53	-0.40	-0.30
30.0	-0.46	-0.56	-0.61	-0.53	-0.43	-0.26
40.0	-0.52	-0.63	-0.67	-0.54	-0.41	-0.23
50.0	-0.54	-0.66	-0.65	-0.46	-0.36	-0.24
60.0	-0.55	-0.69	-0.64	-0.40	-0.28	-0.19
70.0	-0.59	-0.76	-0.68	-0.32	-0.20	-0.11
80.0	-0.91	-1.17	-0.96	-0.23	-0.13	-0.07
80.0f	-1.93	-2.03	-1.29			
85.0	-1.16	-0.76	-0.49			
90.0	-0.73	-0.39	-0.47	-0.17	-0.07	-0.04

LOWER SURFACE

percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	0.44	0.46	0.60	0.45	0.48	0.46
1.25	-0.22	-0.09	0.06	0.11	-0.05	
2.5	-0.25	-0.13	-0.03	0.03	-0.07	-0.20
5.0	-0.25	-0.15	-0.07	-0.04	-0.13	-0.25
7.5	-0.23	-0.17	-0.10	-0.10	-0.22	-0.27
10.0	-0.25	-0.19	-0.12	-0.13	-0.23	-0.27
15.0	-0.26	-0.20	-0.15	-0.17	-0.25	-0.29
20.0	-0.25	-0.19	-0.14	-0.18	-0.26	-0.29
25.0	-0.24	-0.17	-0.13	-0.18	-0.27	-0.29
30.0	-0.22	-0.13	-0.10	-0.18	-0.28	-0.29
40.0	- .16	-0.06	-0.04	-0.17	-0.25	-0.25
50.0	-0.09	0.05	0.06	-0.15	0.00	-0.22
60.0	0.04	0.17	0.13	-0.10	-0.18	-0.17
70.0	0.15	0.29	0.21	-0.08	-0.12	-0.09
80.0	0.78	0.69	0.53	-0.03	-0.03	-0.03
90.0	0.52	0.46	0.28	0.04	0.03	0.00

Figure 21.-Pressure Coefficient values with
Angle of Attack = -4°
Flap Deflection = 45°
and $R_e = 2.70 \times 10^6$

CONFIDENTIAL INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	0.39	-0.08	-0.50	-0.55	-0.48	-0.40
1.25	-0.42	-0.90	-1.50	-1.66	-1.61	
2.5	-0.47	-0.84	-1.16	-1.35	-1.36	-0.99
5.0	-0.52	-0.79	-1.00	-1.12	-1.06	-0.74
7.5	-0.51	-0.74	-0.90	-0.98	-0.89	-0.64
10.0	-0.53	-0.74	-0.86	-0.96	-0.80	-0.62
15.0	-0.57	-0.74	-0.81	-0.80	-0.73	-0.54
20.0	-0.59	-0.75	-0.82	-0.79	-0.68	-0.49
25.0	-0.62	-0.78	-0.82	-0.79	-0.67	-0.46
30.0	-0.65	-0.77	-0.81	-0.76	-0.66	-0.37
40.0	-0.67	-0.78	-0.82	-0.72	-0.59	-0.38
50.0	-0.66	-0.78	-0.77	-0.61	-0.49	-0.30
60.0	-0.65	-0.78	-0.75	-0.50	-0.39	-0.24
70.0	-0.66	-0.83	-0.75	-0.40	-0.28	-0.17
80.0	-0.96	-1.22	-1.00	-0.29	-0.19	-0.13
80.0f	-1.97	-1.97	-1.23			
85.0	-1.13	-0.73	-0.47			
90.0	-0.71	-0.38	-0.45	-0.21	-0.11	-0.11

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	0.39	-0.08	-0.50	-0.55	-0.48	-0.40
1.25	0.22	0.35	0.40	0.44	0.44	
2.5	0.12	0.25	0.31	0.39	0.38	0.27
5.0	0.05	0.16	0.22	0.26	0.23	0.07
7.5	0.02	0.10	0.15	0.18	0.12	0.00
10.0	-0.03	0.07	0.11	0.13	0.07	-0.05
15.0	-0.08	0.01	0.05	0.06	0.00	-0.12
20.0	-0.08	-0.02	0.03	0.01	-0.05	-0.15
25.0	-0.09	-0.02	0.02	-0.03	-0.08	-0.19
30.0	-0.09	0.00	0.03	-0.04	-0.11	-0.21
40.0	-0.07	0.03	0.05	-0.07	-0.13	-0.23
50.0	0.00	0.12	0.10	-0.07	0.00	-0.20
60.0	0.09	0.21	0.16	-0.06	-0.12	-0.18
70.0	0.19	0.30	0.23	-0.05	-0.08	-0.14
80.0	0.77	0.51	0.51	-0.02	-0.03	-0.07
90.0	0.53	0.46	0.27	0.03	0.02	-0.04

Figure 21 (cont'd.).- Pressure Coefficient values with
Angle of Attack = 0°
Flap Deflection = 45°
and $R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-0.10	-1.45	-2.69	-3.08	-3.36	-3.13
1.25	-1.13	-2.05	-2.81	-3.72	-4.02	
2.5	-1.02	-1.53	-2.07	-2.47	-2.51	-2.02
5.0	-0.93	-1.32	-1.70	-1.93	-1.88	-1.37
7.5	-0.84	-1.15	-1.46	-1.62	-1.50	-1.16
10.0	-0.83	-1.12	-1.34	-1.40	-1.32	-1.06
15.0	-0.79	-1.04	-1.19	-1.22	-1.13	-0.85
20.0	-0.80	-1.01	-1.15	-1.13	-1.01	-0.75
25.0	-0.81	-1.01	-1.10	-1.08	-0.96	-0.68
30.0	-0.83	-0.97	-1.06	-1.02	-0.90	-0.53
40.0	-0.80	-0.95	-1.01	-0.92	-0.76	-0.53
50.0	-0.79	-0.91	-0.92	-0.76	-0.61	-0.44
60.0	-0.74	-0.88	-0.86	-0.63	-0.48	-0.41
70.0	-0.74	-0.90	-1.00	-0.49	-0.36	-0.31
80.0	-1.01	-1.25	-1.05	-0.36	-0.25	-0.27
80.0f	-1.89	-1.89	-1.21			
85.0	-1.08	-0.71	-0.37			
90.0	-0.67	-0.36	-0.43	-0.25	-0.16	-0.25

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-0.10	-1.45	-2.69	-3.08	-3.36	-3.13
1.25	0.44	0.47	0.39	0.31	0.30	
2.5	0.36	0.44	0.45	0.43	0.44	[illegible]
5.0	0.26	0.36	0.41	0.42	0.41	0.30
7.5	0.20	0.30	0.34	0.36	0.34	0.21
10.0	0.14	0.25	0.29	0.31	0.27	0.14
15.0	0.08	0.17	0.22	0.23	0.19	-0.03
20.0	0.05	0.13	0.18	0.17	0.12	-0.04
25.0	0.03	0.11	0.14	0.12	0.07	-0.10
30.0	0.02	0.11	0.14	0.08	0.03	-0.14
40.0	0.03	0.12	0.14	0.03	-0.03	-0.19
50.0	0.06	0.17	0.17	0.01	0.00	-0.20
60.0	0.14	0.25	0.20	0.00	-0.07	-0.20
70.0	0.22	0.32	0.25	-0.02	-0.06	-0.17
80.0	0.74	0.67	0.51	0.00	-0.02	-0.30
90.0	0.54	0.47	0.27	0.03	0.00	-0.28

Figure 21 (cont'd.).- Pressure Coefficient values with
Angle of Attack = 4°
Flap Deflection = 45°
and $R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-1.20	-3.91	-6.32	-6.77	-2.99	-1.37
1.25	-2.16	-3.07	-4.32	-5.35	-2.65	
2.5	-1.62	-2.46	-3.33	-3.84	-2.50	-1.09
5.0	-1.39	-2.00	-2.53	-2.86	-2.29	-1.12
7.5	-1.22	-1.68	-2.11	-2.37	-2.12	-1.12
10.0	-1.16	-1.58	-1.87	-2.04	-1.98	-1.11
15.0	-1.08	-1.39	-1.60	-1.69	-1.71	-1.07
20.0	-1.04	-1.29	-1.48	-1.51	-1.51	-1.01
25.0	-1.02	-1.24	-1.39	-1.39	-1.34	-0.94
30.0	-1.01	-1.18	-1.29	-1.28	-1.21	-0.74
40.0	-0.95	-1.10	-1.19	-1.11	-0.99	-0.76
50.0	-0.89	-1.03	-1.05	-0.91	-0.82	-0.68
60.0	-0.82	-0.96	-0.95	-0.74	-0.68	-0.62
70.0	-0.79	-0.96	-0.89	-0.58	-0.57	-0.56
80.0	-1.03	-1.26	-1.04	-0.45	-0.46	-0.55
80.0f	-1.83	-1.78	-1.11			
85.0	-1.03	-0.67	-0.41			
90.0	-0.63	-0.31	-0.39	-0.32	-0.38	-0.55

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-1.20	-3.91	-6.32	-6.77	-2.99	-1.37
1.25	0.50	0.29	0.03	-0.14	0.21	
2.5	0.50	0.46	0.37	0.27	0.43	0.39
5.0	0.44	0.49	0.48	0.48	0.49	[illegible]
[illegible]	0.37	0.45	0.46	0.47	0.43	0.22
10.0	0.32	0.40	0.43	0.45	0.38	0.14
[illegible]	0.24	0.33	0.36	0.37	0.29	[illegible]
20.0	0.19	0.28	0.32	0.30	0.22	-0.02
25.0	0.17	0.24	0.27	0.24	0.15	-0.08
30.0	0.14	0.23	0.26	0.20	0.10	-0.13
40.0	0.13	0.21	0.22	0.13	0.03	-0.20
50.0	0.14	0.24	0.23	0.08	0.00	-0.22
60.0	0.20	0.29	0.26	0.05	-0.06	-0.25
70.0	0.27	0.36	0.29	0.02	-0.08	-0.22
80.0	0.77	0.66	0.50	0.01	-0.06	-0.19
90.0	0.56	0.48	0.29	0.03	-0.07	-0.19

Figure 21 (cont'd.).- Pressure Coefficient values with
Angle of Attack = 8°
Flap Deflection = 45°
and R_e = 2.70×10^6

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-2.63	-6.43	-3.46	-1.71	-1.07	-0.87
1.25	-3.42	-4.28	-2.66	-1.40	-0.96	
2.5	-2.33	-3.39	-2.65	-1.42	-0.98	-0.80
5.0	-1.88	-2.64	-2.49	-1.45	-1.00	-0.82
7.5	-1.59	-2.20	-2.33	-1.44	-1.00	-0.82
10.0	-1.48	-2.00	-2.20	-1.42	-1.00	-0.83
15.0	-1.31	-1.71	-1.97	-1.39	-0.98	-0.84
20.0	-1.23	-1.56	-1.81	-1.34	-0.96	-0.84
25.0	-1.18	-1.45	-1.66	-1.28	-0.94	-0.83
30.0	-1.16	-1.36	-1.54	-1.24	-0.92	-0.70
40.0	-1.07	-1.23	-1.36	-1.15	-0.90	-0.80
50.0	-0.98	-1.13	-1.22	-1.10	-0.88	-0.79
60.0	-0.89	-1.05	-1.10	-1.03	-0.86	-0.78
70.0	-0.86	-1.03	-1.00	-0.96	-0.83	-0.75
80.0	-1.08	-1.27	-0.90	-0.88	-0.79	-0.74
80.0f	-1.86	-1.71	-0.96			
85.0	-1.04	-0.75	-0.74			
90.0	-0.63	-0.36	-0.61	-0.79	-0.71	-0.72

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-2.63	-6.43	-3.46	-1.71	-1.07	-0.87
1.25	0.41	-0.03	0.11	0.25	0.38	
2.5	0.54	0.38	0.42	0.44	0.46	0.36
5.0	0.55	0.53	0.54	0.51	0.45	0.27
7.5	0.51	0.53	0.53	0.48	0.39	0.21
10.0	0.46	0.51	0.51	0.45	0.34	0.14
15.0	0.39	0.45	0.44	0.37	0.25	0.04
20.0	0.33	0.39	0.38	0.30	0.19	-0.07
25.0	0.29	0.35	0.34	0.24	0.12	-0.12
30.0	0.26	0.33	0.30	0.19	0.07	-0.16
40.0	0.22	0.28	0.25	0.11	-0.25	-0.24
50.0	0.22	0.29	0.25	0.05	0.00	-0.27
60.0	0.26	0.33	0.25	0.00	-0.14	-0.30
70.0	0.31	0.39	0.29	-0.06	-0.18	-0.29
80.0	0.80	0.67	0.49	-0.11	-0.19	-0.27
90.0	0.60	0.46	0.25	-0.15	-0.23	-0.27

Figure 21 (cont'd.).- Pressure Coefficient values with Angle of Attack = 12°, Flap Deflection = 45° and $R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.093	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-4.04	-3.21	-1.88	-1.33	-0.97	-0.73
1.25	-3.66	-2.56	-1.44	-1.03	-0.82	
2.5	-2.86	-2.50	-1.45	-1.03	-0.85	-0.71
5.0	-2.21	-2.41	-1.45	-1.04	-0.83	-0.72
7.5	-1.83	-2.27	-1.45	-1.03	-0.82	-0.71
10.0	-1.65	-2.22	-1.43	-1.03	-0.83	-0.73
15.0	-1.45	-1.96	-1.39	-1.01	-0.82	-0.73
20.0	-1.35	-1.84	-1.36	-1.01	-0.82	-0.73
25.0	-1.28	-1.71	-1.33	-1.00	-0.82	-0.73
30.0	-1.25	-1.58	-1.30	-1.01	-0.82	-0.62
40.0	-1.15	-1.40	-1.26	-0.99	-0.82	-0.74
50.0	-1.08	-1.28	-1.21	-0.98	-0.82	-0.75
60.0	-0.99	-1.17	-1.16	-0.96	-0.82	-0.76
70.0	-0.95	-1.10	-1.09	-0.91	-0.80	-0.72
80.0	-1.16	-1.05	-1.03	-0.88	-0.77	-0.76
80.0f	-1.93	-1.28	-1.19			
85.0	-1.09	-0.92	-0.82			
90.0	-0.71	-0.71	-0.72	-0.89	-0.72	-0.74

LOWER SURFACE

Percent chord	Sta. 0.093	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-4.04	-3.21	-1.88	-1.33	-0.97	-0.73
1.25	0.26	0.11	0.21	0.26	0.30	
2.5	0.53	0.47	0.45	0.43	0.43	0.36
5.0	0.62	0.62	0.55	0.50	0.45	0.31
7.5	0.60	0.61	0.54	0.49	0.40	0.24
10.0	0.56	0.59	0.51	0.45	0.37	0.17
15.0	0.48	0.51	0.45	0.39	0.29	0.08
20.0	0.43	0.45	0.40	0.32	0.22	-0.01
25.0	0.38	0.40	0.34	0.25	0.15	-0.08
30.0	0.34	0.37	0.32	0.20	0.09	-0.14
40.0	0.29	0.32	0.26	0.12	-0.01	-0.23
50.0	0.27	0.32	0.24	0.05	0.00	-0.27
60.0	0.29	0.34	0.24	-0.02	-0.14	-0.17
70.0	0.33	0.39	0.28	-0.08	-0.19	-0.32
80.0	0.82	0.67	0.49	-0.14	-0.20	-0.31
90.0	0.61	0.43	0.22	-0.21	-0.25	-0.32

Figure 21 (cont'd.).- Pressure Coefficient values with
Angle of Attack = 16^{o}
Flap Deflection = 45^{o}
and $R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-4.86	-1.83	-1.45	-1.22	-0.95	-0.68
1.25	-3.83	-1.73	-1.30	-1.00	-0.81	
2.5	-3.28	-1.73	-1.31	-1.00	-0.81	-0.69
5.0	-2.65	-1.70	-1.31	-1.00	-0.81	-0.69
7.5	-2.29	-1.66	-1.30	-1.00	-0.81	-0.69
10.0	-2.05	-1.64	-1.28	-0.99	-0.81	-0.69
15.0	-1.70	-1.58	-1.27	-0.98	-0.81	-0.69
20.0	-1.55	-1.55	-1.24	-0.98	-0.81	-0.69
25.0	-1.43	-1.51	-1.23	-0.92	-0.81	-0.70
30.0	-1.39	-1.48	-1.21	-0.98	-0.81	-0.61
40.0	-1.28	-1.42	-1.19	-0.97	-0.81	-0.71
50.0	-1.21	-1.36	-1.18	-0.96	-0.80	-0.71
60.0	-1.14	-1.29	-1.15	-0.96	-0.80	-0.72
70.0	-1.09	-1.24	-1.12	-0.95	-0.79	-0.72
80.0	-1.19	-1.18	-1.12	-0.95	-0.76	-0.71
80.0f	-1.88	-1.35	-1.23			
85.0	-1.16	-1.09	-0.90			
90.0	-0.91	-0.92	-0.79	-0.98	-0.73	-0.71

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-4.86	-1.83	-1.45	-1.22	-0.95	-0.68
1.25	0.13	0.13	0.15	0.17	0.24	
2.5	0.52	0.47	0.42	0.39	0.41	0.34
5.0	0.68	0.61	0.55	0.52	0.47	0.33
7.5	0.69	0.63	0.56	0.52	0.45	0.28
10.0	0.66	0.61	0.55	0.50	0.42	0.22
15.0	0.59	0.55	0.50	0.44	0.35	0.13
20.0	0.52	0.50	0.45	0.37	0.28	0.04
25.0	0.46	0.45	0.39	0.31	0.22	-0.03
30.0	0.42	0.42	0.36	0.25	0.15	-0.10
40.0	0.35	0.36	0.30	0.17	0.04	-0.20
50.0	0.32	0.34	0.27	0.08	0.00	-0.25
60.0	0.34	0.36	0.27	0.01	-0.12	0.17
70.0	0.36	0.40	0.29	-0.08	-0.17	-0.31
80.0	0.82	0.67	0.51	-0.14	-0.19	-0.30
90.0	0.60	0.40	0.22	-0.22	-0.25	-0.32

Figure 21 (cont'd.).- Pressure Coefficient values with
Angle of Attack = 20°
Flap Deflection = 45°
and $R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-3.01	-1.51	-1.24	-1.09	-0.82	-0.65
1.25	-2.32	-1.49	-1.22	-0.98	-0.75	
2.5	-2.24	-1.50	-1.22	-0.98	-0.76	-0.66
5.0	-2.13	-1.47	-1.21	-0.98	-0.77	-0.66
7.5	-2.01	-1.45	-1.20	-0.97	-0.76	-0.64
10.0	-1.90	-1.44	-1.20	-0.97	-0.76	-0.66
15.0	-1.72	-1.40	-1.18	-0.95	-0.76	-0.66
20.0	-1.61	-1.39	-1.17	-0.95	-0.76	-0.66
25.0	-1.50	-1.38	-1.16	-0.94	-0.77	-0.66
30.0	-1.45	-1.35	-1.14	-0.94	-0.77	-0.57
40.0	-1.35	-1.34	-1.14	-0.94	-0.76	-0.67
50.0	-1.30	-1.31	-1.14	-0.92	-0.75	-0.68
60.0	-1.25	-1.28	-1.12	-0.93	-0.75	-0.68
70.0	-1.21	-1.25	-1.11	-0.94	-0.74	-0.58
80.0	-1.22	-1.22	-1.13	-0.95	-0.74	-0.67
80.0f	-1.83	-1.44	-1.24			
85.0	-1.30	-1.16	-0.97			
90.0	-1.11	-1.01	-0.87	-0.98	-0.74	-0.66

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-3.01	-1.51	-1.24	-1.09	-0.82	-0.65
1.25	0.24	0.08	0.08	0.11	0.17	
2.5	0.59	0.44	0.40	0.36	0.38	0.30
5.0	0.74	0.63	0.57	0.53	0.50	0.35
7.5	0.75	0.66	0.59	0.55	0.49	0.30
10.0	0.73	0.67	0.59	0.54	0.47	0.26
15.0	0.67	0.62	0.55	0.49	0.42	0.17
20.0	0.60	0.57	0.50	0.43	0.35	0.09
25.0	0.55	0.52	0.45	0.38	0.28	0.02
30.0	0.50	0.48	0.41	0.32	0.22	-0.05
40.0	0.42	0.42	0.34	0.22	0.11	-0.16
50.0	0.38	0.40	0.31	0.13	0.00	-0.22
60.0	0.38	0.40	0.30	0.04	-0.07	-0.10
70.0	0.40	0.43	0.32	-0.05	-0.13	-0.29
80.0	0.86	0.70	0.53	-0.13	-0.17	-0.28
90.0	0.61	0.43	0.24	-0.22	-0.24	-0.29

Figure 21 (cont'd.).- Pressure Coefficient values with
Angle of Attack = 24°
Flap Deflection = 45°
and $R_e = 2.70 \times 10^6$

CONFIDENTIAL
INFORMATION

CONFIDENTIAL
INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-1.88	-1.27	-1.15	-0.96	-0.78	-0.68
1.25	-1.57	-1.27	-1.16	-0.96	-0.76	
2.5	-1.52	-1.28	-1.16	-0.96	-0.76	-0.68
5.0	-1.46	-1.27	-1.16	-0.96	-0.76	-0.68
7.5	-1.43	-1.27	-1.15	-0.96	-0.76	-0.68
10.0	-1.40	-1.26	-1.14	-0.95	-0.76	-0.69
15.0	-1.35	-1.25	-1.13	-0.93	-0.77	-0.69
20.0	-1.32	-1.23	-1.13	-0.84	-0.77	-0.70
25.0	-1.28	-1.23	-1.12	-0.84	-0.77	-0.70
30.0	-1.27	-1.22	-1.10	-0.84	-0.77	-0.60
40.0	-1.24	-1.21	-1.09	-0.92	-0.76	-0.70
50.0	-1.21	-1.21	-1.08	-0.91	-0.76	-0.70
60.0	-1.21	-1.21	-1.08	-0.91	-0.76	-0.71
70.0	-1.19	-1.21	-1.05	-0.91	-0.76	-0.71
80.0	-1.20	-1.20	-1.04	-0.92	-0.76	-0.70
80.0f	-1.74	-1.44	-1.23			
85.0	-1.36	-1.20	-1.03			
90.0	-1.23	-1.06	-0.90	-0.93	-0.76	-0.70

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-1.88	-1.27	-1.15	-0.96	-0.78	-0.68
1.25	0.30	0.05	-0.02	0.00	0.07	
2.5	0.62	0.04	0.35	0.30	0.32	0.24
5.0	0.79	0.65	0.56	0.52	0.50	0.34
7.5	0.80	0.70	0.62	0.57	0.52	0.33
10.0	0.79	0.71	0.63	0.58	0.50	0.29
15.0	0.74	0.68	0.61	0.54	0.46	0.21
20.0	0.68	0.63	0.57	0.50	0.40	0.13
25.0	0.62	0.60	0.51	0.44	0.34	0.05
30.0	0.57	0.56	0.47	0.38	0.28	-0.02
40.0	0.50	0.49	0.40	0.27	0.17	-0.14
50.0	0.44	0.45	0.36	0.17	0.00	-0.21
60.0	0.43	0.45	0.34	0.08	-0.03	-0.11
70.0	0.45	0.47	0.35	-0.02	-0.11	-0.29
80.0	0.89	0.74	0.55	-0.12	-0.15	-0.29
90.0	0.63	0.46	0.25	-0.19	-0.24	-0.31

Figure 21 (cont'd.).- Pressure Coefficient values with
Angle of Attack = 28°
Flap Deflection = 45°
and R_e = 2.70 x 10^6

CONFIDENTIAL
INFORMATION

INFORMATION

UPPER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-1.54	-1.22	-1.13	-0.96	-0.77	-0.69
1.25	-1.44	-1.22	-1.14	-0.95	-0.75	
2.5	-1.40	-1.23	-1.14	-0.95	-0.76	-0.69
5.0	-1.36	-1.24	-1.14	-0.95	-0.76	-0.69
7.5	-1.34	-1.21	-1.13	-0.94	-0.76	-0.69
10.0	-1.32	-1.23	-1.13	-0.93	-0.76	-0.70
15.0	-1.28	-1.20	-1.12	-0.91	-0.76	-0.71
20.0	-1.26	-1.20	-1.11	-0.91	-0.77	-0.71
25.0	-1.23	-1.19	-1.10	-0.90	-0.77	-0.71
30.0	-1.23	-1.18	-1.09	-0.90	-0.73	-0.61
40.0	-1.19	-1.18	-1.08	-0.90	-0.77	-0.71
50.0	-1.18	-1.19	-1.07	-0.90	-0.76	-0.71
60.0	-1.18	-1.18	-1.06	-0.89	-0.76	-0.72
70.0	-1.16	-1.16	-1.04	-0.88	-0.76	-0.67
80.0	-1.16	-1.14	-1.01	-0.89	-0.77	-0.72
80.0f	-1.71	-1.43	-1.18			
85.0	-1.36	-1.16	-1.04			
90.0	-0.68	-1.05	-0.95	-0.90	-0.78	-0.71

LOWER SURFACE

Percent chord	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.960
00.00	-1.54	-1.22	-1.13	-0.96	-0.77	-0.69
1.25	0.28	0.00	-0.08	-0.07	0.00	
2.5	0.61	0.40	0.32	0.26	0.29	0.19
5.0	0.79	0.65	0.58	0.52	0.50	0.34
7.5	0.82	0.71	0.63	0.58	0.53	0.34
10.0	0.82	0.73	0.66	0.60	0.53	0.30
15.0	0.76	0.71	0.64	0.58	0.50	0.24
20.0	0.71	0.67	0.60	0.54	0.45	0.16
25.0	0.66	0.63	0.56	0.48	0.39	0.08
30.0	0.61	0.59	0.52	0.43	0.32	0.02
40.0	0.53	0.52	0.44	0.32	0.21	-0.11
50.0	0.47	0.48	0.40	0.22	0.01	-0.19
60.0	0.45	0.47	0.37	0.12	0.00	-0.25
70.0	0.46	0.49	0.38	0.01	-0.08	-0.29
80.0	0.90	0.73	0.56	-0.08	-0.14	-0.29
90.0	0.64	0.46	0.27	-0.17	-0.24	-0.31

Figure 21 (cont'd.).- Pressure Coefficient values with Angle of Attack = 30°
Flap Deflection = 45°
and $R_e = 2.70 \times 10^6$

INFORMATION

INFORMATION

Angle of Attack	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.980
-4	0.39	0.28	0.25	0.28	0.24	0.22
0	0.26	0.52	0.51	0.54	0.42	0.37
4	0.30	0.28	0.32	0.31	0.27	0.21
8	0.29	0.27	0.27	0.28	0.26	0.24
12	0.31	0.28	0.28	0.27	0.32	0.37
16	0.30	0.29	0.32	0.39	0.40	0.38
20	0.33	0.37	0.39	0.42	0.40	0.39
24	0.32	0.40	0.41	0.41	0.41	0.38
28	0.41	0.42	0.40	0.43	0.42	0.39
30	0.41	0.42	0.43	0.44	0.43	0.39

a) Flap deflection = 0°

Angle of Attack	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.980
0	0.30	0.56	0.48	0.39	0.39	0.26
4	0.48	0.44	0.43	0.35	0.26	0.25
8	0.45	0.41	0.39	0.35	0.26	0.29
12	0.39	0.38	0.34	0.32	0.37	0.38
16	0.39	0.37	0.40	0.40	0.40	0.42
20	0.36	0.42	0.45	0.42	0.40	0.38
24	0.40	0.44	0.46	0.42	0.42	0.38
28	0.49	0.45	0.45	0.43	0.41	0.40
30	0.46	0.46	0.45	0.42	0.41	0.40

b) Flap deflection = 15°

Angle of Attack	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.980
-4	0.79	0.72	0.68	0.60	0.28	0.24
0	0.61	0.57	0.51	0.38	0.28	0.20
4	0.36	0.48	0.44	0.39	0.28	0.25
8	0.44	0.44	0.39	0.30	0.27	0.31
12	0.41	0.40	0.37	0.39	0.39	0.40
16	0.41	0.40	0.44	0.42	0.41	0.45
20	0.42	0.45	0.42	0.44	0.42	0.43
24	0.45	0.47	0.47	0.43	0.42	0.41
28	0.48	0.47	0.46	0.44	0.42	0.41
30	0.49	0.48	0.48	0.44	0.43	0.41

c) Flap deflection = 30°

Angle of Attack	Sta. 0.098	Sta. 0.270	Sta. 0.442	Sta. 0.615	Sta. 0.787	Sta. 0.980
-4	0.71	0.63	0.57	0.44	0.42	0.61
0	0.60	0.44	0.49	0.35	0.30	0.24
4	0.51	0.49	0.46	0.32	0.29	0.20
8	0.46	0.41	0.40	0.30	0.30	0.36
12	0.44	0.40	0.40	0.41	0.40	0.40
16	0.45	0.42	0.45	0.45	0.43	0.43
20	0.42	0.46	0.45	0.43	0.41	0.40
24	0.47	0.48	0.49	0.43	0.42	0.41
28	0.49	0.48	0.48	0.45	0.42	0.41
30	0.47	0.50	0.48	0.44	0.41	0.42

d) Flap deflection = 45°

Figure 22.- Centers of Pressure for the Local Normal Force Profiles.

CONFIDENTIAL
INFORMATION

JNCLASSIFIED

43099

d Servicess Technical Information Agency

ARLINGTON HALL STATION
ARLINGTON 12 VIRGINIA

ARD

ONI

WHEN GOVERNMENT OR OTHER DRAWINGS, SPECIFICATIONS OR OTHER DATA FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE U. S. GOVERNMENT THEREBY INCURS RESPONSIBILITY, NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

CLASSIFICATION CHANGED TO UNCLASSIFIED

AUTHORITY OF ASTIA RECLASS. BULLETIN 12

1 Sept. 58

Signed Richard E. Reedy
OFFICE SECURITY ADVISOR